INSTRUCTION AND MAINTENANCE MANUAL

ITHACO MODEL 254A

ITHACO

MODEL 254

INSTRUCTION AND MAINTENANCE MANUAL

CONTENTS

Introduction

Specification

Operating Instructions

Theory of Operation

- General
- Functional Description
- Gain Controls
- Preamplifier
- Postamplifier
- Postamplifier and Output Stage
- Isolator
- Attenuator

Calibration

Warranty

Parts Lists

Drawings

Item	Elem. Diagrams	Assembly
A1	B20123	B20127
A2	B20115	B20137
A3	B20114	B20126
A4	B20121	B20139 (Mod. 254)
A4	B20118	B20136 (Mod. 254A)
Final	C30013	B20158 (Mod. 254)
		B20138 (Mod. 254A)

Serial Number 1273

INTRODUCTION

Model 254* is a 1000 megohm input impedance amplifier providing calibrated gain from 10 db to 80 db.

Gain stability and linearity over a wide range of operating conditions is assured by negative feedback in every stage, and by use of stable components where appropriate.

Model 254A differs from Model 254 only by the replacement of the 10 db continuous control with a 1 db step attenuator.

Typical applications are with sensors such as capacitor microphones, IR detectors, and various semiconductor transducers; and signal conditioning in conjunction with a variety of other electronic equipment.

* Patent pending on circuit configurations.

SPECIFICATIONS

Gain	
Coarse	10 to 70 db in 10 db steps
Fine (Mod. 254)	0 to 10 db continuous
(Mod. 254A)	0 to 10 db in 1 db steps
Gain accuracy	±0.5 db
Noise performance, 25 C	
Broadband noise*	
Shorted input	7 micro volts rms
1000 pf source	9 microvolts
100 pf source	12 microvolts
10 K source	8 microvolts
Input Impedance	
1000 meg	
30 pf	
Frequency response	-3 db at 0.5 cps and 100 KC.
Output characteristics (-25 v power supply)	
AC coupled output	
output impedance	50 ohms in series with 100 ufd
max. output current	1 ma rms (10 ma)**
max output voltage	5 v rms into 10 K, (1K)**
DC coupled output	50 ohms
Maximum output	5 v rms into 10 K 1 v rms into 50 ohms
Power supply	-25 v ± 5 v @ 15 ma, (40 ma)**
Temperature range	-25° to +55° C operating, -55° to +85° C storage
Mechanical	Panel 2.63" H X 5.25" W, 3.75" D

---

* referred to input at maximum gain setting in 20 cps-100 kcps band

**Output current and power drain are increased by external jumper

OPERATING INSTRUCTIONS

The Model 254 amplifier is a high input impedance amplifier with switchable gain. Gain is controlled by two front panel controls which are the only controls associated with the amplifier.

To operate the amplifier, power must be supplied through the rear connector. Although the specification permits operation from any voltage between -20 volts and -30 volts, it is desirable to operate with approximately -25 volts. In a laboratory environment and with a -25 volt power supply, typical gain accuracy is 0.1 db. As shown on B20114, B- is supplied on pin B and ground on pin A.

Because of the low cutoff frequency of the amplifier, several seconds must be allowed after application of power before the amplifier operates normally.

The normal AC-coupled output capability is 5 volt rms into a 10 K load. Dynamic output impedance is 50 ohms. Should it be desirable to drive an impedance of less than 10 K at maximum output, the available output current may be increased by connecting pin F on the rear connector to pin D. Reference to B20114 shows that making this connection increases the current in the output amplifier.

In addition to the AC coupled output, a DC-coupled output is available at pin E on the rear connector. Shorting pins E and C provides direct coupling to the front panel BNC. When this is done, it is possible to drive 1 volt rms into a terminated 50 ohm line. The maximum output voltage increases to 5 volt rms as the resistive load is increased from 50 ohms. This output may be shorted to ground without damage to the amplifier. Care should be taken not to short the output to B- as the output capacitor may be damaged.

THEORY OF OPERATION

Functional Description

Figure 1 is a functional block diagram showing the basic components of the Model 254 amplifier, and their card designations A1 through A4.

Preamplifier A1 is a high-input impedance, low noise amplifier set at either 10 db or 40 db gain, depending on gain control setting. Attenuator A4 provides precisely-controlled attenuation over a 0 to 40 db range. Postamplifier A2 has a fixed gain of 40 db, and A3 consists of an Output Amplifier and Isolator.

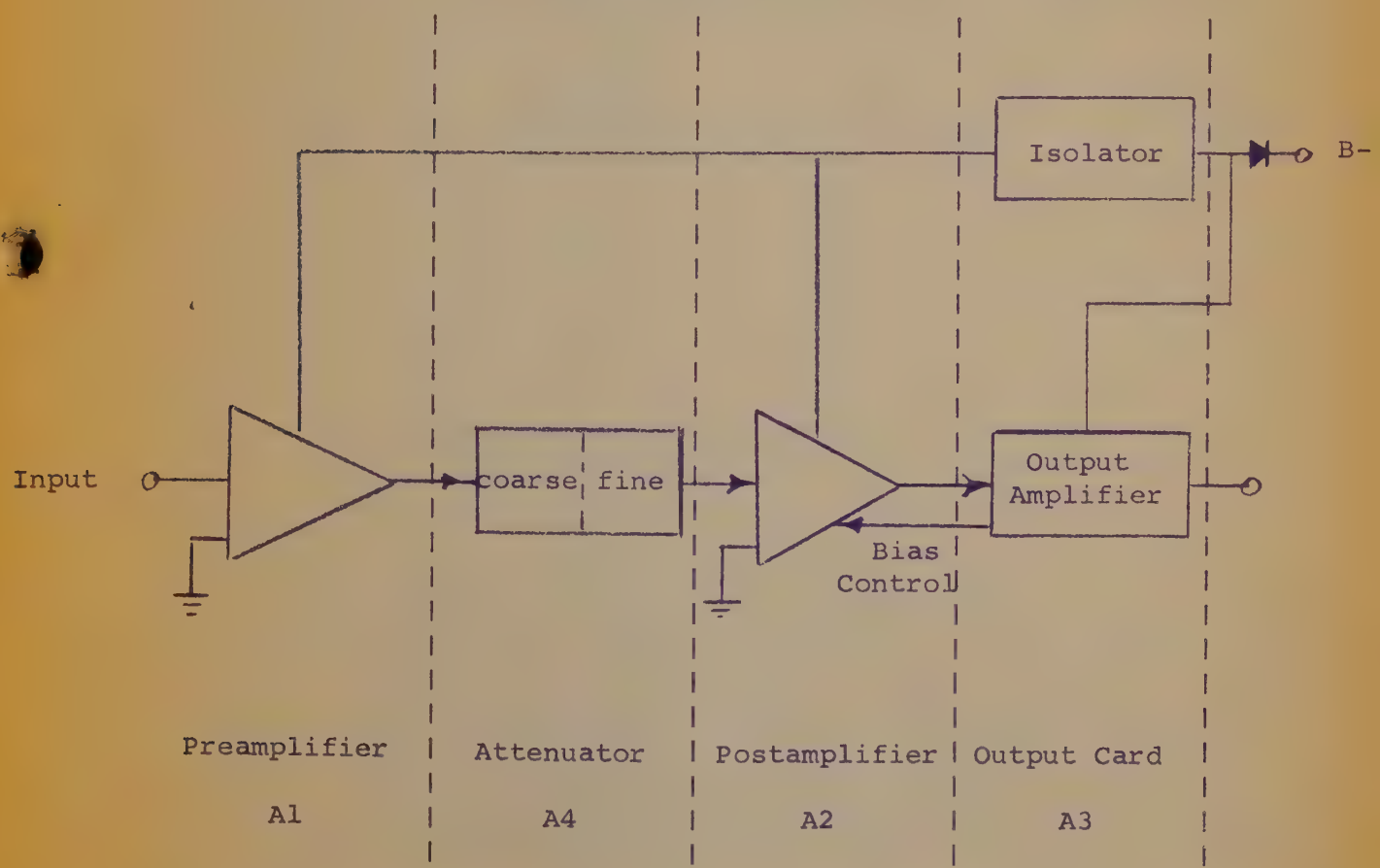


Figure 1

DC operating point of the Output Amplifier A3, which is driven direct-coupled by A2, is controlled by bias feedback to A2. The function of the Isolator is to suppress hum and ripple appearing at the power supply terminal, and to present a high impedance to the power supply.

Gain Controls

Amplifier gain is selected by the coarse and fine panel gain controls. In Model 254, the fine gain control consists of a continuous control with precisely 10 db of range; in Model 254A, a one db step attenuator is substituted.

Coarse gain control is obtained by a combination of feedback switching and a ladder attenuator such that limiting occurs first in the output stage at any gain setting. For the condition where the fine gain control is set at 0 db, gain and attenuation for the various amplifier components are tabulated below, in db.

Coarse Gain Setting	Preamplifier Gain (A1)	Attenuation (A4)	Postamplifier Gain (A2)
10	10	40	40
20	10	30	40
30	10	20	40
40	10	10	40
50	40	30	40
60	40	20	40
70	40	10	40

For the condition where the fine gain control is set at 10 db, the attenuation shown above is reduced by 10 db.

Preamplifier A1

The schematic of the preamplifier is shown on drawing B20123. The configuration uses negative feedback to increase input impedance and improve stability. The input field effect transistor, Q1, is operated as an inverting amplifier. Q2 supplies drain bias current for Q1, and in addition provides current gain because signal is coupled directly to its gate by C1. The output from Q2 is applied to an emitter follower, Q4, whose output is applied to a grounded base stage Q5. The purpose of Q5 is to obtain a DC level shift to enable direct coupling into the base of Q6, a grounded emitter amplifier. Thus there are two inversions, that occurring in Q1 and that occurring in Q6. The output from Q6 is fed back

through a precision voltage divider to the source of Q1. This divider determines the closed loop gain of the preamplifier. As may be observed, the five transistors comprising the preamplifier are connected together in a DC manner. The DC operating point at the preamplifier output is controlled by a feedback divider R16 and R3 to the gate of Q2.

A1 provides 10 db gain with S1A in positions 1, 2, 3, or 4; and 40 db gain when S1A is in positions 5, 6, or 7. In the 10 db setting, gain is determined by R14 and R5. In the 40 db setting, R5 is paralleled by the combination of R10, R11, and R12.

For normal operation with a -25 volt power supply, the voltage supplied to A1 will be approximately -23 V. Under these conditions the DC output voltage measured at the collector of Q6 should be approximately -14 v. The output drives the attenuator network directly.

Post Amplifier A2

The Postamplifier shown on drawing B20115 operates in a manner very similar to the preamplifier. The major difference is that it operates with a fixed gain of 40 db rather than having switchable gain. The other difference is that the output of A2 is DC coupled to the output amplifier, and operating point controlled by dc feedback from the output stage rather than from the collector of Q6.

Output Amplifier A3

The schematic for the output amplifier A3 and power supply isolator are shown on drawing B20114. The output amplifier consists of Q1 and Q2 and their associated parts. The output of A2 is inserted through R1 into the base of Q1. Q1 and Q2 are arranged in complementing manner such that the AC voltage from the output of A2 to the emitter of Q1 is essentially unity. For load impedances high compared to 50 ohms, essentially no attenuation occurs in R7. As mentioned in the description of A2, the dc feedback to determine the ac output level of A2 is obtained from the output amplifier. This is taken directly from the collector of Q2 through R11 and C4 back to A2.

Because the voltage at the collector of Q2 is held constant by means of dc feedback, any current increase in Q2 will not disturb the operating voltage. It is thus possible to ground R5 and increase the current level in Q2 without disturbing the dc operating point. This additional current flowing in Q2 allows a

larger ac current to be driven into a load then is possible without R5. The reason the connection for R5 is made optional is that the power drain is also increased when R5 is connected to ground.

As can be seen from the schematic, connecting the dc output to a low impedance to ground requires much more current on Q2. This current gives rise to a voltage drop across R6 and the maximum output is reduced. For example, connecting a 50 ohm load to ground from pin E permits only 1 volt rms output. In this case the line is matched and the output voltage is attenuated by 6 db.

Isolator A3

Located on the same wiring card as the output stage is the power supply isolator formed by Q3, Q4, and their associated components. Q3 and Q4 are connected in a complementary manner such that they appear as a single transistor whose gain is the product of the individual gains of the transistor. This active filter is used to multiply the effective capacitance of C3 and thus supply power decoupling down to a very low frequency.

Attenuator A4

The Attenuator Card shown on drawing B20121 or B20139 consists of a coarse attenuator and a fine attenuator operate by S1B and S2A (or R12) respectively. The coarse attenuator is a ladder network which provides 0, 10, 20, or 30 db attenuation. In Model 254 the fine attenuator consists of a potentiometer trimmed for a range of exactly 0 to 10 db. In Model 254 , the fine attenuator consists of a precision voltage divider with 1 db steps selected by S2A. This card requires no adjustment except in case of malfunction.

MAINTENANCE AND CALIBRATION

In order to achieve high input impedance, low noise, and gain stability the Model 254 Amplifier uses a unique circuit configuration for which patent is pending. Unless maintenance is performed by persons familiar with solid state circuitry including field effect transistors, it is recommended that the amplifier be returned to the factory for servicing. Certain parts must be replaced in groups and reference should be made to the parts lists.

There are two internal gain adjustments provided for amplifier calibration. These adjustments have been preset at the factory and will not normally require readjustment unless parts are replaced. One adjustment is provided on A1 and one on A2. Their location is shown in drawings B20158 or B20138. In order to adjust gain of the amplifier, the case must be removed, and care exercised to prevent 60 cycle pickup. Gain should be checked after the case is replaced.

> Caution: Solid state circuits are easily damaged by accidentally shorting circuit components, even in a transient manner.

The following procedure is recommended by checking gain calibration and, if necessary, making adjustments. Figure 2 shows the most desirable test configuration since it eliminates most meter inaccuracy.

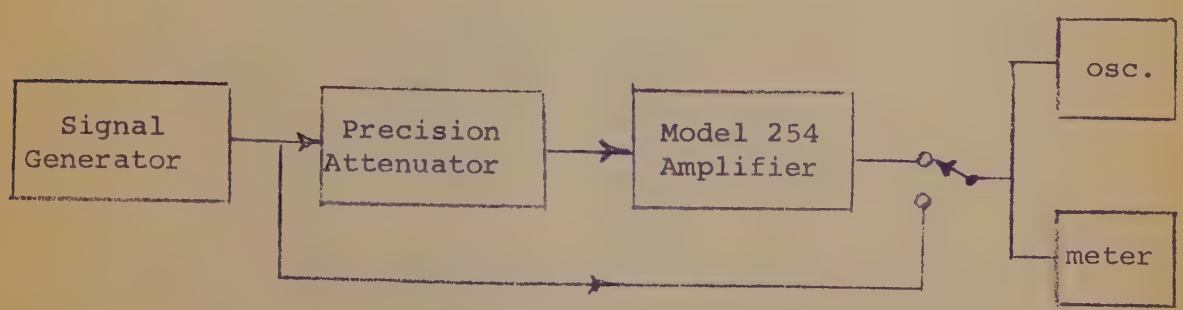


Figure 2

1. After applying -25 volts ±5% power to the amplifier allow approximately 30 seconds for stabilization.

2. Set the precision attenuator for 20 db, amplifier switch S1 for 20 db and s2 for 0 db.

3. Adjust the signal generator for 1 volt rms at 1 kc.

4. Measure the amplifier output voltage which should be 1 volt rms. If it is not, adjust R12 on A2 (B20137) until the output is within 1% of the signal generator voltage. This is not valid unless the attenuator used is better than 1%.

5. Set the attenuator for 50 db, amplifier switch S1 for 50 db, and S2 for 0 db.

6. Compare the amplifier output voltage with the signal generator output. If required adjust R12 on A1 (B20127) to make the two signals equal.

7. No other adjustments are provided. All gain settings may be checked by setting the attenuator equal to the gain setting and comparing the signal generator output with the amplifier output. All settings should be accurate within 5%.

8. Frequency response need be checked only for the gain settings in step 2 and step 5. The output voltage should be within 3 db fo that at 1 kc from 0.5 cps to 100 kc.

Should it be deemed necessary to return the amplifier to the factory, refer to the instructions called out in the warranty.

WARRANTY

ITHACO, Inc. warrants each instrument to be free of defects in material and workmanship for a period of one year after shipment to the original purchaser; vacuum tubes, semiconductors, and batteries are specifically excluded. Liability under this warranty is limited to repairing or adjusting any instrument returned to the factory for that purpose. The warranty for this instrument is void if the instrument has been modified other than in accordance with written instructions from ITHACO, or if defect or failure is judged by ITHACO to be caused by abnormal conditions of operation, storage, or transportation.

This warranty is subject to verification by ITHACO, that a defect or failure exists, and to compliance by the original purchaser with the following instructions:

1. Before returning the instrument, notify ITHACO with full details of the problem; include model number and serial number of the instrument involved.

2. After receiving the above information, ITHACO will give you shipping instructions or service instructions. After receipt of shipping instructions, ship the instrument to ITHACO. Full liability for damage during shipment is borne by the purchaser. It is recommended that instruments shipped to us be fully insured and packed surrounded by at least two inches of shock-absorbing material.

ITHACO reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

This warranty is expressly in lieu of all other obligations or liabilities on the part of ITHACO, and ITHACO neither assumes, nor authorizes any other person to assume for it, any liability in connection with the sales of ITHACO instruments.

2/26/65

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B70127

CONT. ON SHEET 2 SH. NO. 1

TITLE ASSEMBLY A1 CARD

FIRST MADE FOR MODEL 754

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
C1	GE 64F24AA104	CAPACITOR 0.1UF, 100V	1
C2	GE 62F104	5UF, 30V	1
C3	GE 62F304	40UF, 30V	1
C4	SPRAGUE 5GA-T47	DISC, 470 pf	1
C5	SPRAGUE 5GA-T15	DISC, 150 pf	1
C6		CAPACITOR	
C7	GE 62F505	CAPACITOR .5UF 50V	1
CR1	FAIRCHILD FD-3157	DIODE	1
Q1	FET	TRANSISTOR	1
Q2	FET		1
Q3			
Q4	2N718		1
Q5	2N1377	TRANSISTOR	1
Q6	2N718	TRANSISTOR	1
R1	IRC CB-1/2	RESISTOR 1500M	1
R2	RC07GF471J	470 Ω	1
R3	AB CB	33M	1
R4	ELECTRA MFSC (AS REQD)	AS REQD	1
R5	ELECTRA MFSCD2371F	2.37K	1
R6			
R7			
R8	RC07GF682J	6.8K	1
R9	RC07GF222J	2.2K	1
R10	ELECTRA MFSCD61R9F	61.9Ω	1
R11	ELECTRA MFSCD162OF	162Ω	1
R12	IRC #110	(POT) 500Ω	1
R13	RC07GF471J	RESISTOR 470Ω	1

PH	SYM	REVISIONS
RG	A	REORDWN & REVISED JLF 10-13-64 VD-14-64
	B	Q3 WAS 2N718, Q4 WAS 2N1377 Q5 WAS 2N718, ADDED R6, C7 C7 WAS 66.5F505 J.Bender 11/9/64
	C	C4 & C5 WERE CMIS J.Bender 11/5/64 RUSH
	D	C4 WAS 100 pf R4 WAS 4.7K JLF 12/8/64
	E	R2 WAS 1K
	F	ALL REF. DES. R1, R10, R3 WAS AB WAS EB

PRINTS TO

MADE BY [illegible] Oct 13, 1964

ISSUED October 14, 1964

APPROVALS

PARTS LIST FOR B70127

CONT. ON SHEET 2 SH. NO. 1

RE

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20127

CONT. ON SHEET FIN SH. NO. 2

TITLE ASSEMBLY A1 CARD

FIRST MADE FOR MODEL 254.

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY
R14	ELECTRA MFSCD5111F	RESISTOR 5.11K	1
R15	RC07GF243J	24K	1
R16	RC07GF106J	10M	1
R17	RC07GF472J	4.7K	1
R18	RC07GF822J	8.2K	1
R19			
R20			
R21	RC07GF681J	RESISTOR 680	1
S1-A	C.T.S. TYPE 212-T1	SWITCH WAFER SECTION	1
1	B20127P1	ASSEMBLY	X
2	B20127P2	CARD (PRINTED WIRING)	1
3	CTC #1785-2	TERMINAL	3
4	CTC #3310-2-03	RECEPTACLE	1
5	CTC #2971-2	PIN	3

	SYM	REVISIONS
PH		
RG	A	REVISED & REDRAWN [illegible] 10-13-64 10-14-64 [illegible]
	B	R15, R16, R17 R18 + R21 WERE RC20 [illegible]

PRINTS TO

MADE BY [illegible], Oct 13, 1964

ISSUED [illegible] 10-13-64

APPROVALS [illegible]

PARTS LIST FOR B20127

CONT. ON SHEET FIN SH. NO. 2

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20137

CONT. ON SHEET 2 SH. NO. 1

TITLE ASSEMBLY A2 CARD

FIRST MADE FOR MODELS 252, 253, 254, 255

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
C1	G.E. 60F24AA104	CAPACITOR 0.1UF, 100V	1
C2	G.E. 60F104	5UF, 30V	1
C3	G.E. 22F304	40UF, 30V	1
C4	SPRAGUE SGA-T47	DISC 470 pf	1
C5	SPRAGUE SGA-T15	CAPACITOR, DISC, 150pf	1
Q1	FET	TRANSISTOR	1
Q2	FET		1
Q3			
Q4	2N718		1
Q5	2N1377		1
Q6	2N718	TRANSISTOR	1
R1		RESISTOR	
R2	RC07GF471J	470Ω	1
R3	AB CB	33M	1
R4	ELECTRA MFSC (AS REQD)	AS REQD	1
R5			
R6			
R7			
R8	RC07GF682J	6.8K	1
R9	RC07GF222J	2.2K	1
R10	ELECTRA MFSCD6189F	61.9Ω	1
R11	ELECTRA MFSCD1620F	162Ω	1
R12	IRC #110	RESISTOR (POT) 500Ω	1

PH	SYM	REVISIONS			
RG	A	REDRAWN & REVISED JJB 10-1-64 10/1/64	D	R2 WAS 1K 7/19/65	
	B	C4 & C5 WERE CHIS. J. BECKER 11/5/64	E	ALL RC07 WERE RC20! R3 WAS TYPE EB	
	C	C4 WAS 100pf, R9 WAS 4.7K. J. BECKER 11-25-69			

PRINTS TO

MADE BY 4/13/64

ISSUED

APPROVALS

PARTS LIST FOR B20137

CONT. ON SHEET 2 SH. NO. 1

ITHACO, INC. ITHACA, N. Y.

REV. NO.	TITLE Assembly A2 [illegible]
PARTS LIST FOR B20137	
CONT. ON SHEET FIN SH. NO. 2	FIRST MADE FOR [illegible]

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY
R13	RC07GF471J	[illegible] 4[illegible]	1
R14	ELECTRA MFSCD5111F	[illegible]	1
R15	RC07GF243J	24 K	1
[illegible]	[illegible]	[illegible]	1
[illegible]	RC07 [illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	1
1	[illegible]	ASSEMBLY	X
2	[illegible]	[illegible]	1
3	CTC #[illegible]	[illegible]	4
4	CTC #[illegible]	[illegible]	1
5	CTC #[illegible]	[illegible]	4

PH	SYM	REVISIONS		
[illegible]	B	REDRAWN & REVISED [illegible]	4/24/65	[illegible]
	C	ALL R207 WERE RC20	JWK 10-26-65	[illegible]

PRINTS TO

MADE BY	APPROVALS	PARTS LIST FOR
J.A. DYER 4/13/64	[illegible]	B20137
ISSUED June 24 1965		CONT. ON SHEET FIN SH. NO. 2

KE

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20126

CONT. ON SHEET 2 SH. NO. 1

TITLE ASSEMBLY A3 CARD

FIRST MADE FOR MODELS 252, 253, 254 255

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
C1	SPRAGUE 5GA-T10	CAPACITOR, DISC 100pf	1
C2	GE# 62F403	100uF, 30V	1
C3	GE# 62F404	60uF 50V	1
C4	SPRAGUE 5GA-T10	DISC 100pf	1
C5	SPRAGUE 5GA-T47	DISC 470pf	1
C6	GE# 64F104A103	.01uF, 100V	1
C7	GE# 62F505	.5uF, 50V	1
C8	GE# 64F104A103	CAPACITOR .01uF 100V	1
CR1	1N4001	DIODE	1
Q1	2N1677	TRANSISTOR	1
Q2	2N1613		1
Q3	2N 577		1
Q4	2N7 8	TRANSISTOR	1
R1	RC07GF102J	RESISTOR 1K	1
R2	RC07GF102J	1K	1
R3	RC07GF331J	330	1
R4	RC07GF682J	6.8K	1
R5	RC32GF471J	470	1
R6	RC42GF221J	220	1
R7	RC20GF470J	47	1
R8	RC07GF225J	2.2M	1
R9	RC07GF104J	100K	1
R10	RC07GF332J	RESISTOR 3.3K	1

PRINTS TO

SYM	REVISIONS
A	[illegible]
B	CHANGED C1, C4, & C5 FROM CMIS TO SPRAGUE
C	ALL [illegible]

MADE BY [illegible]

ISSUED [illegible]

APPROVALS

PARTS LIST FOR B20126

CONT. ON SHEET 2 SH. NO. 1

ITHACO, INC. ITHACA, N. Y.

REV. NO.	TITLE ASSEMBLY
PARTS LIST FOR B20126	A3 CARD
CONT. ON SHEET F SH. NO. 2	FIRST MADE FOR MODELS 252, 253, 254, 255

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1					
R11	RC07GF105J	RESISTOR 1M	1					
R12	RC07GF331J	↕ 330	1					
R13	RC07GF104J	RESISTOR 100K	1					
1	B20126P1	ASSEMBLY	X					
2	B20126P2	CARD, PRINTED WIRING	1					
3	CTC # 3310-2-03	RECEPTACLE	11					
4	THERMALLOY #1101-A	HEATSINK	1					

PH	SYM	REVISIONS				
RG	A	REVISED & REDRAWN	[illegible]			
	B	ALL RC07 WERE RC20	BUK 10-26-66 [illegible]			
PRINTS TO						

MADE BY J. Be[illegible] March 16, 66	APPROVALS	PARTS LIST FOR B20126
RE ISSUED [illegible]	[illegible]	CONT. ON SHEET F SH. NO. 2

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20139

CONT. ON SHEET F SH. NO. 1

TITLE ASSEMBLY A4 CARD

FIRST MADE FOR MODEL 234, 253

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
C1	GE* 62F403	CAPACITOR 100μF 30V	1
C2	AS REQ'D	CAPACITOR (AS REQ'D)	1
R1	ELECTRA MF5CD 9311F	RESISTOR 9.31K	1
R2	RC07GF115J	1.1MEG	1
R3	ELECTRA MF5CD 1372F	13.7K	1
R4	RC07GF115J	1.1MEG	1
R5	ELECTRA MF5CD 1372F	13.7K	1
R6	RC07GF225J	2.2MEG	1
R7	ELECTRA MF5CD 2002F	20K	1
R8	ELECTRA MF5CD 2002F	20K	1
R9	ELECTRA MF5CD 2002F	20K	1
R10	ELECTRA MF5CD 2941F	RESISTOR 2.94K	1
R11	ELECTRA MF5CD	RESISTOR	1 (OPT 1-(2))
R12	A10034	RESISTOR	1 (INCLUDES R1)
R13	AS REQ'D	RESISTOR (AS REQ'D)	1
1	B20139P1	ASSEMBLY	X
2	B20160P1	CARD	1
3	CTC # 1785-2	TERMINAL	1
4	CTC # 3310-2-03	RECEPTACLE	3
5	CTC # 2971-2	PIN	1
S1B	CTS TYPE 212 T1	SWITCH WAFER SECTION	1

SYM	REVISIONS
B	REVISED & REDRAWN 10/2/64
C	ALL RC07 WERE RC20 10-27-66

PRINTS TO

MADE BY J. DYER APPROVED

ISSUED February 2, 1964

APPROVALS

PARTS LIST FOR B20139

CONT. ON SHEET F SH. NO. 1

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR [illegible]

CONT. ON SHEET 2 SH. NO. 1

TITLE [illegible]

FIRST MADE FOR MODEL 254A, 253A

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY
[illegible]	[illegible]	[illegible]	1
[illegible]	[illegible]	[illegible]	1
	[illegible]	[illegible]	[illegible]
R1	MF[illegible]	[illegible] K	1
R2	[illegible]	[illegible]	1
R3	MF[illegible]	[illegible]	1
R4	[illegible]	[illegible]	1
R5	MF[illegible]	[illegible] K	1
R6	R[illegible]	2.[illegible] M	1
R7	MF5CD[illegible]	[illegible]	1
R8	MF5CD[illegible]	[illegible]	1
R9	MF5CD[illegible]	20 K	1
R10	MF[illegible]	1.[illegible] K	1
R11	MF5CD3030F	303[illegible]	1
R12	MF5CD[illegible]	[illegible]	1
R13	MF[illegible]	1.5[illegible]	1
R14	MF[illegible]	[illegible]	1
R15	MF5CD5760F	5[illegible]	1
R16	MF5CD[illegible]0F	5[illegible]	1
R17	MF5CD4530F	453[illegible]	1
R18	MF5CD4020F	4[illegible]	1
R19	MF5CD3570F	35[illegible] Ω	1
R20	RC07GF824J	8[illegible] K	1
R21	MF5CD2941F	2.94 K	1
R22	AS REQD	[illegible] (AS REQ[illegible]	1
S1B	A10137 P1	SWITCH WAFER [illegible]	1
S2B	A10137 P1	SWITCH, WAFER SECTION	1

SYM	REVISIONS
-	[illegible] 10/[illegible]
B	[illegible] 1-27-65
C	ALL RC07 WERE R20 [illegible] 10-27-65

PRINTS TO

MADE BY J [illegible]

ISSUED [illegible]

APPROVALS

PARTS LIST FOR [illegible]

CONT. ON SHEET 2 SH. NO. 1

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20136

CONT. ON SHEET F SH. NO. 2

TITLE ASSEMBLY A4 CARD

FIRST MADE FOR MODEL 254A 253A

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
1	B20136P1	ASSEMBLY	X
2	B20160P1	CARD	1
3	CTC# 1735-2	TERMINAL	1
4	CTC# 3310-2-03	RECEPTACLE	3
5	CTC# 2971-2	PIN	1

SYM	REVISIONS
RA	
RG	

PRINTS TO

MADE BY J. [illegible]

ISSUED [illegible]

APPROVALS

PARTS LIST FOR B20136

CONT. ON SHEET F SH. NO. 2

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20158

CONT. ON SHEET 2 SH. NO. 1

TITLE ASM LAB AMPLIFIER

FIRST MADE FOR MODEL 254

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

	SYM	REVISIONS
PRINTS TO		

MADE BY [illegible] Oct 26, 1964

ISSUED [illegible]

APPROVALS [illegible]

PARTS LIST FOR B20158

CONT. ON SHEET 2 SH. NO. 1

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20158

CONT. ON SHEET 3 SH. NO. 2

TITLE ASM LAB AMPLIFIER

FIRST MADE FOR MODEL 254

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
1	B20158P1	ASM	X
2	B20220P5	PANEL, FRONT	1
3	B20225P2	CAN	1
4	B20224P1	ASM, FRONT PLATE (INCLUDES PT 16)	1
5	B20151P1	SPACER	1
6	B20222P1	PLATE, INSULATING	1
7	A10102P1	PLATE, REAR	1
8	SOUTHCO NO. S1-28-506-24	FASTENER, FRONT PANEL	2
9	B20149P5	INDEX, SWITCH (2.00 LG)	1
10	RAYTHEON NO. 70-3-2G	KNOB	2
11	AMATOM NO. 9284-B-140	SPACER, ROUND 1/8 LG	8
13	B20226P1	SHIELD, BLANK CARD	3
14	AMATOM NO. 8391-B-0632	SPACER, HEX 5/16 LG	2
15	B20150P1	SPACER	1
16	PEM NO. FH-632-6	FASTENER, SELF-CLINCH (PT OF PT4)	2
17	AMATOM NO 8396-B-0632	SPACER, HEX 5/8 LG	2
18	AMATOM NO. 8394-B-0632	SPACER, HEX 1/2 LG	2
19	M.P.C. NO. 1-96	WASHER, INSULATING	2
20	AMATOM NO. 8217-B-0440	SPACER, HEX (1/4) 5/8 LG	2
21		SCR, PAN HD #4-40 x 1/4 LG	4
22		LOCKWASHER, INT. #4	10
23		HEX NUT #4-40	6
24		SCR, PAN HD. #4-40 x 7/16 LG	6
25		SCR. STOCK #6-32 x 3 1/2 LG	2
26		LOCKWASHER, INT. #6	4
27		HEX NUT #6-32	2
28		LOCKWASHER, INT. #10	1
29		HEX NUT #10-32	1

SYM	REVISIONS
A	GEN'L REVISIONS J. BAGGER 11/16/64 11/18/64

RA

PRINTS TO

MADE BY J. Bagger Oct. 16, 1964

ISSUED October 27, 1964

APPROVALS

PARTS LIST FOR B20158

CONT. ON SHEET 3 SH. NO. 2

ITHACO, INC. ITHACA, N. Y.

REV. NO.	TITLE ASM LAB AMPLIFIER
PARTS LIST FOR B20158	FIRST MADE FOR MODEL 254
CONT. ON SHEET FIN SH. NO. 3	

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
30	AMATOM NO. 8393-B-0632	SPACER, HEX 7/16 LG	2
31	AMATOM NO. 9289-B-140	SPACER, ROUND 7/16 LG	2
32	SMITH NO 2158	WASHER, FIBRE 3/8 DIA	2
33		WASHER, FLAT #6	2
35	SMITH # 119	BEARING, PANEL	1
37		SCR., PAN HD #6-32 x 3/8 LG	2
38	AMATOM NO 9292-B-140	SPACER, ROUND 5/8 LG	8
39	AMATOM NO 8588-B-0632	SPACER, HEX 1/8 LG	8

RA	SYM	REVISIONS
	A	GEN'L REVISIONS J. BROCKER 11/16/64 11/18/64

PRINTS TO

MADE BY	APPROVALS	PARTS LIST FOR
J. L. Fuller, Oct 16, 1964		B20158
ISSUED October 27, 1964		CONT. ON SHEET FIN SH. NO. 3

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B 20138

CONT. ON SHEET 2 SH. NO. 1

TITLE ASM

AB AMPLIFIER

FIRST MADE FOR MOD 254A

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY
A	B20127G1	ASM, CARD	1
A2	B20137G1	ASM, CARD	1
A3	B20126G1	ASM, CARD	1
A4	B20136G1	ASM, CARD	1
J1	UG-1094/U	CONNECTOR	1
J2	UG-1094/U	CONNECTOR	1
J3	CANNON NO DBM-13W3P	CONNECTOR	1

SYM	REVISIONS

PRINTS TO

MADE BY [illegible], OCT 16, 1964

ISSUED [illegible]

APPROVALS

PARTS LIST FOR B20138

CONT. ON SHEET 2 SH. NO. 1

ITHACO, INC. ITHACA, N. Y.

REV. NO.	TITLE ASM
PARTS LIST FOR B20138	LAB AMPLIFIER
CONT. ON SHEET 3 SH. NO. 2	FIRST MADE FOR MOD 254A

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
1	B20138P1	ASM	X
2	B20220P6	PANEL, FRONT	1
3	B20225P2	CAN	1
4	B20224P1	ASM, FRONT PLATE (INCLUDES PT 16)	1
5	B20151P1	SPACER	1
6	B20222P1	PLATE, INSULATING	1
7	A10102P1	PLATE, REAR	1
8	SOUTHCO NO. 51-28-506-24	FASTENER, FRONT PANEL	2
9	B20149P5	INDEX, SWITCH (2.00LG)	2
10	RAYTHEON NO. 70-3-2G	KNOB	2
11	AMATOM NO. 9284-B-140	SPACER, [illegible], 1/8 LG	8
13	B20226P1	SHIELD, BLANK CARD	3
14	AMATOM NO. 8391-B-0632	SPACER, HEX, 5/16 LG	2
15	B20150P1	SPACER	1
16	PEM NO. FH-632-6	FASTENER, SELF-CLINCH (PART OF PT 4)	2
17	AMATOM NO. 8396-B-0632	SPACER, HEX, 5/8 LG	2
18	AMATOM NO. 8394-B-0632	SPACER, HEX, 1/2 LG	2
19	M.P.C. NO. 1-96	WASHER, INSULATING	2
20	AMATOM NO. 8212-B-0440	SPACER, HEX, 5/8 LG (1/4)	2
21		SCR., PAN HD. #4-40 x 1/4 LG	4
22		LOCKWASHER, INT. #4	10
23		HEX NUT #4-40	
24		SCR., PAN HD #4-40 x 7/16 LG	6
25		SCR STOCK #6-32 x 3 1/2 LG	2
26		LOCKWASHER, INT #6	4
27		HEX NUT #6-32	2
28		LOCKWASHER, INT #10	1
29		HEX NUT #10-32	1

	SYM	REVISIONS
	A	GEN'L REVISIONS J. Brown 11/16/64 [illegible]
RA		

PRINTS TO

MADE BY	APPROVALS	PARTS LIST FOR
[illegible], Oct. 16, 1964	[illegible]	B20138
ISSUED [illegible] 30, 1964		CONT. ON SHEET 3 SH. NO. 2

ITHACO, INC. ITHACA, N. Y.

REV. NO.

PARTS LIST FOR B20138

CONT. ON SHEET FIN SH. NO. 3

TITLE ASM LAB AMPLIFIER

FIRST MADE FOR MODEL 254A

ITEM	IDENTIFICATION NUMBER	DESCRIPTION OR NAME	GROUP NO. & QUANTITY 1
30	AMATOM NO. 8393-B-0632	SPACER, HEX 3/16 LG	2
31	AMATOM NO 9289-B-140	SPACER, ROUND 7/16 LG	2
32	SMITH NO 2158	WASHER, FIBRE 3/8 DIA	2
33		WASHER FLAT #6	2
37		SCR, PAN HD #6-32 x 3/8 LG	2
38	AMATOM NO. 9292-B-140	SPACER, ROUND 5/8 LG	8
39	AMATOM NO 8388-B-0632	SPACER, HEX 1/8 LG	8

RA	SYM	REVISIONS
	A	GEN'L REVISIONS J. Becker 11/16/64 11/18/64

PRINTS TO

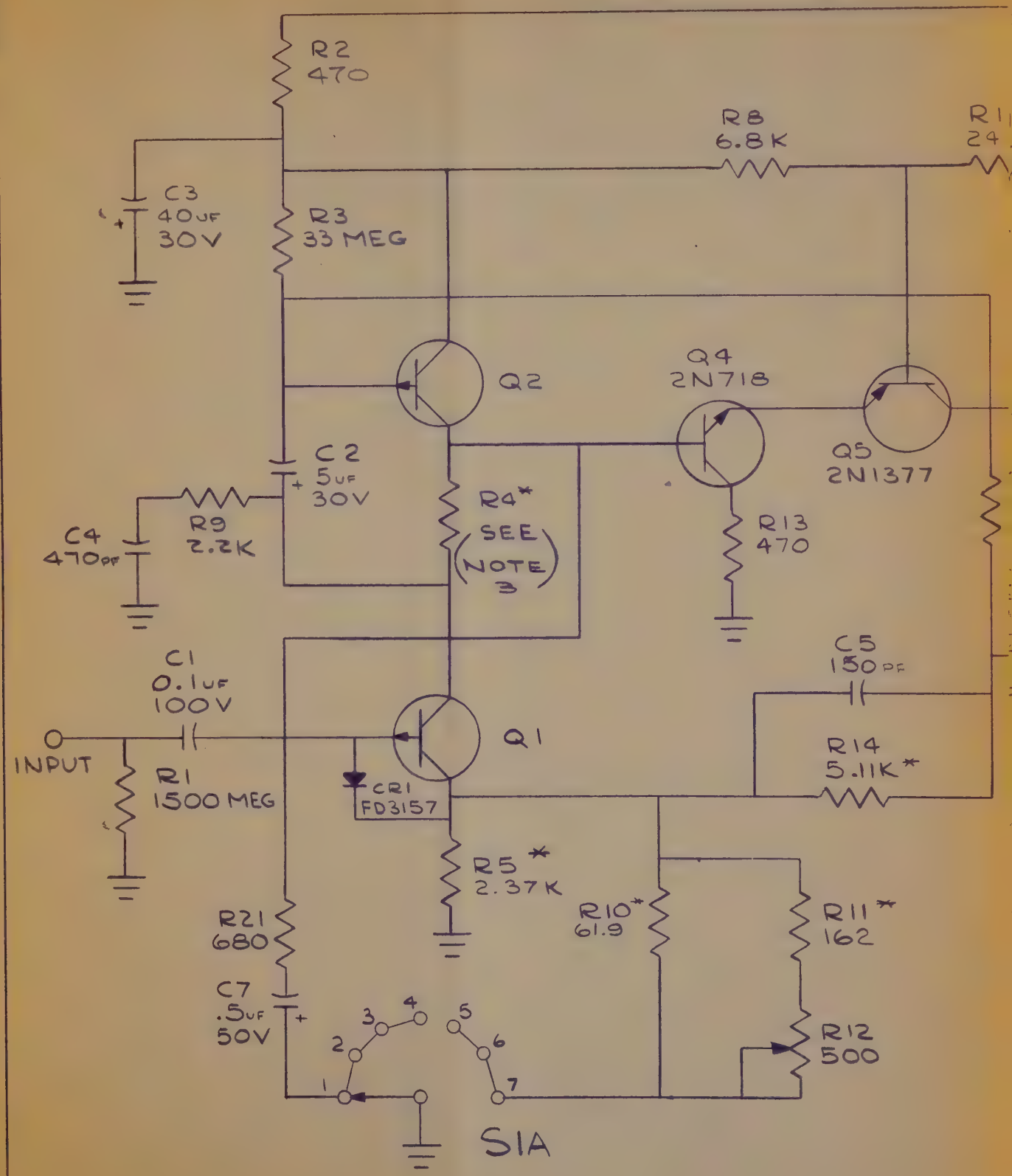
MADE BY Oct 16, 1964

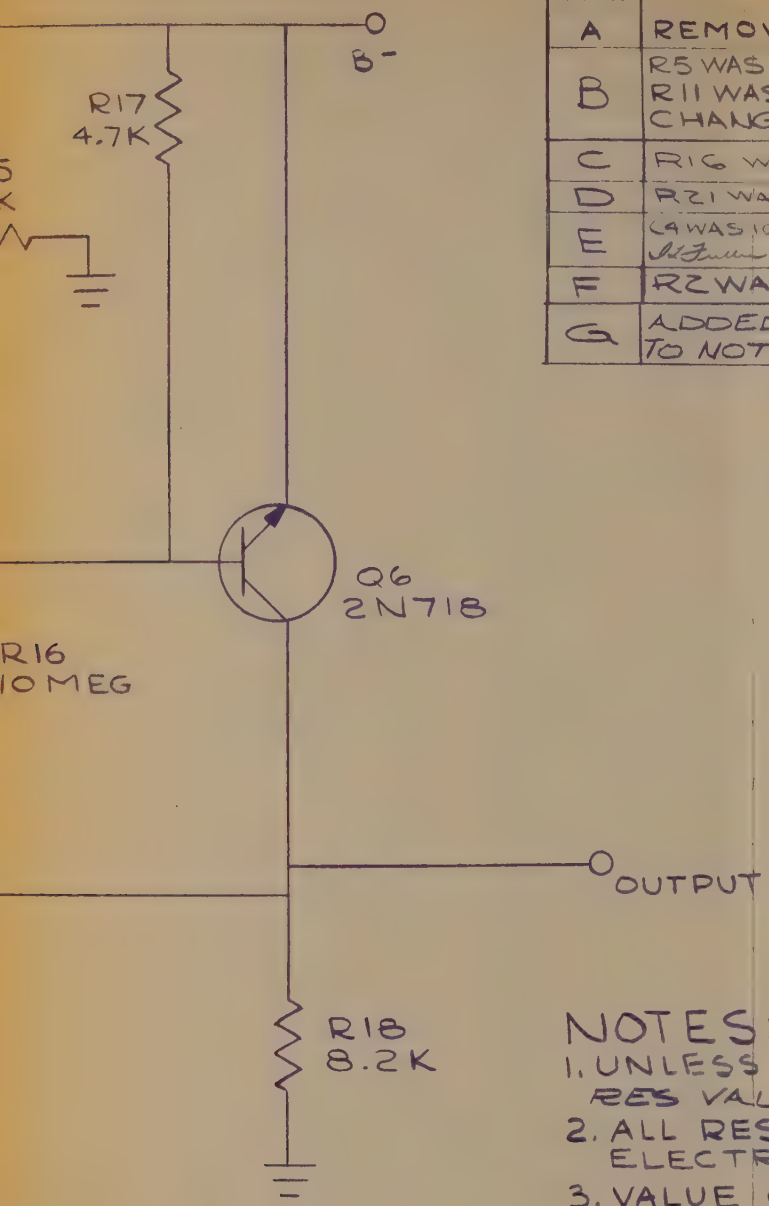
ISSUED October 30 1964

APPROVALS

PARTS LIST FOR B20138

CONT. ON SHEET FIN SH. NO. 3


R2
470
R8
6.8K
R1
24
C3
40UF
30V
R3
33 MEG
Q2
Q4
2N718
Q5
2N1377
C2
5UF
30V
R9
2.2K
C4
470PF
R4*
SEE
NOTE
3
R13
470
C5
150PF
C1
0.1UF
100V
INPUT
R1
1500 MEG
Q1
CR1
FD3157
R14
5.11K*
R5*
2.37K
R21
680
R10*
61.9
R11*
162
C7
.5UF
50V
R12
500
1
2
3
4
5
6
7
S1A



REVISIONS B 20123

CONT. ON SH. SH. NO.

SYM.	DESCRIPTION	DATE	APPROVAL
A	REMOVED C6 4-21-64 JB	4/21/64	
B	R5 WAS 2.4K, R10 WAS 62, R11 WAS 160, R14 WAS 5.1K CHANGED NOTE 2 JB 9-28-64	9-30-64	
C	R16 WAS 1/4W 10/12/64	10/12/64	
D	R21 WAS TO R9, C2 10-28-64	10-28-64	
E	C4 WAS 100pf, R9 WAS 4.7K Nov. 24, 1964	11/24/64	
F	R2 WAS 1K May 13, 1965	5/13/65	
G	ADDED 1/4W TO NOTE 1 JWK 10-26-65	10/26/65	

NOTES:

1. UNLESS OTHERWISE NOTED, ALL RES VALUES IN OHMS ± 5% TOL. 1/4W.
2. ALL RES. MARKED '*' ARE ELECTRA MF5C ± 1% TOL.
3. VALUE OF R4 DETERMINED BY CHARACTERISTICS OF Q1.

RA
RG

ELEM. DIAG.

A1 CARD

FMF MODEL 254

DRAWN BY J. Becker March 5, 1964

APPROVAL: DFTG. ENG.

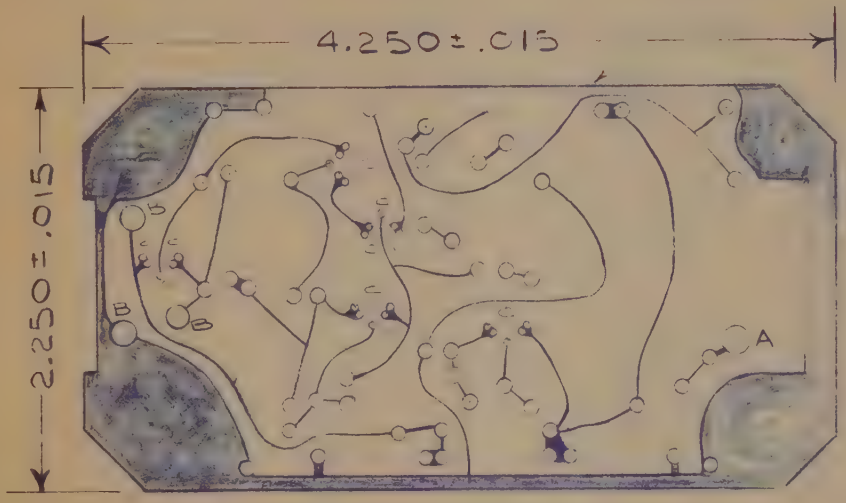
ISSUE DATE Apr. 16, 1964

ITHACO, INC.
ITHACA, N.Y.

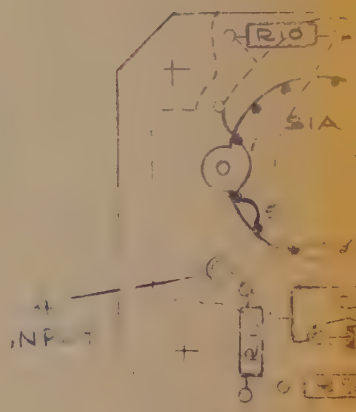
B 20123

CONT. ON SH. SH. NO.

2 PRINTED WIRIN



REAR VIEW



FR

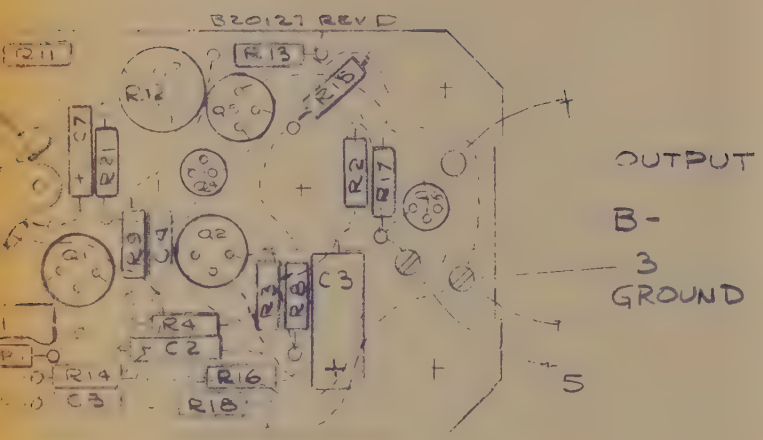
LTR	DESCRIPTION	PAD DIA	QTY
A	.096 (#41)	.188	1
B	.067 (#51)	.125	3
C	.025 (#72)	.060	25
NONE	.040 (#60)	.090	53

MATERIAL-G
CONDUCTORS
.031
WATER-DI
FOR ELEM

+ - PIN & F

REVISIONS	B 20127		
		CONT ON SH	SH NO
SYM.	DESCRIPTION	DATE	APPROVAL
B	REVISED & REDRAWN	9-1-64	[illegible]
C	RELOCATED CR1, ADDED JUMPER		
D	RELOCATED TRANSISTOR LEADS AND PADS	[illegible]	[illegible]

JG BOARD



ONT VIEW

1 ASSEMBLY

OD EPOXY, G-10, 1/16 THK
NE OUNCE COPPER,
DE (NOM), .020 MIN.
LACQUER
IAG SEE B20123

TAIL

SEE SEPARATE PARTS LIST

RG

ASSEMBLY

AI CARD

FMF MODEL 254

DRAWN BY J. BECKER MAR 18, 1964

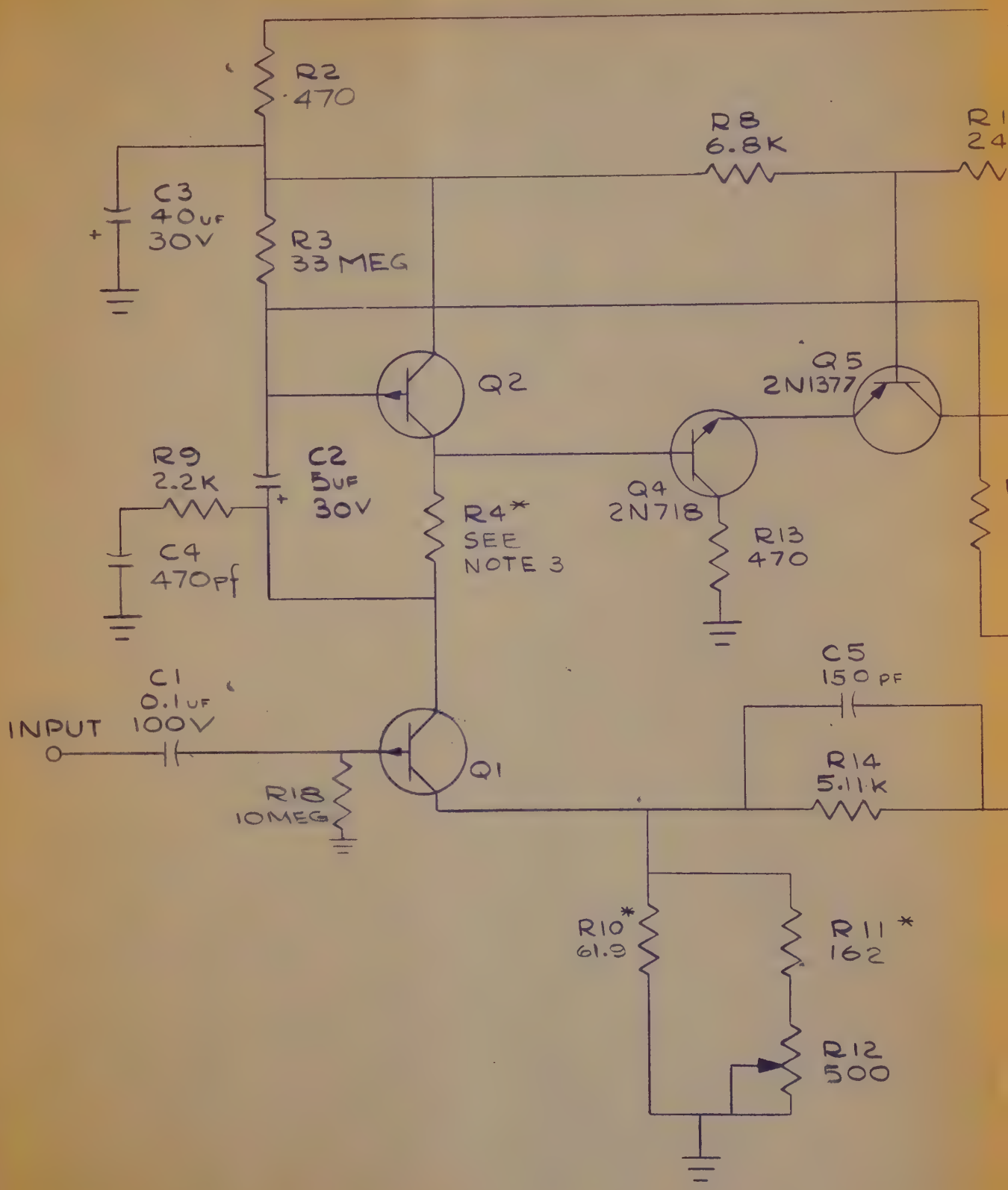
APPROVAL: DFTG. ENG.

ISSUE DATE September 1, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20127

CONT. ON SH. SH. NO.


R2
470
R8
6.8K
C3
40UF
30V
R3
33 MEG
Q2
Q5
2N1377
R9
2.2K
C2
5UF
30V
Q4
2N718
R4*
SEE
NOTE 3
R13
470
C4
470pf
C5
150 pF
C1
0.1UF
100V
INPUT
Q1
R14
5.11K
R18
10MEG
R10*
61.9
R11*
162
R12
500

REVISIONS

B 20115

CONT. ON SH. SH. NO.

SYM.	DESCRIPTION	DATE	APPROVAL
A	C2 WAS .5UF. REMOVED R5 JB 5/4/64	5/4/64	
B	R18 WAS CR1 JBF 7-9-64	7/9/64	
C	R10 WAS 62, R11 WAS 160 R14 WAS 5.1K, NOTE 2 WAS RN60B. Sept 9, 1964.	9/[illegible]/64	
D	R16 WAS 1/4W JBF 10-12-64	10/12/64	
E	C4 WAS 100pf, R9 WAS 4.7K J BECKER 11-23-64		
F	R2 WAS 1K	4/14/65	
G	ADDED 1/4W TO NOTED BWK 10-26-65	10/28/65	

NOTES:

1. UNLESS OTHERWISE NOTED ALL RES. VALUES IN OHMS, ±5% TOL 1/4W
2. ALL RES. MARKED '*' ARE ELECTRA MF5C, ± 1% TOL.
3. R4 VALUE DETERMINED BY CHARACTERISTICS OF Q1.

RA
RG

ELEM. DIAG.

A2 CARD

FMF 252, 253, 254, 255

DRAWN BY J. Becker February 27, 1964

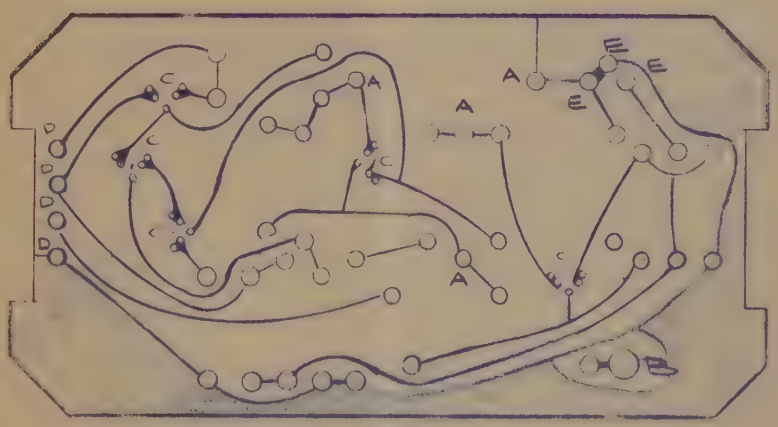
APPROVAL: DFTG. ENG.

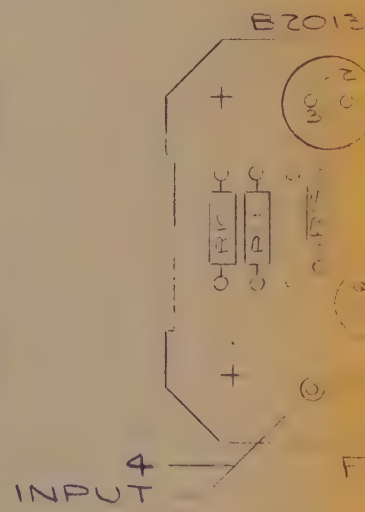
ISSUE DATE April 16, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20115

CONT. ON SH. SH. NO.





MATL
COND

WATE
FOR

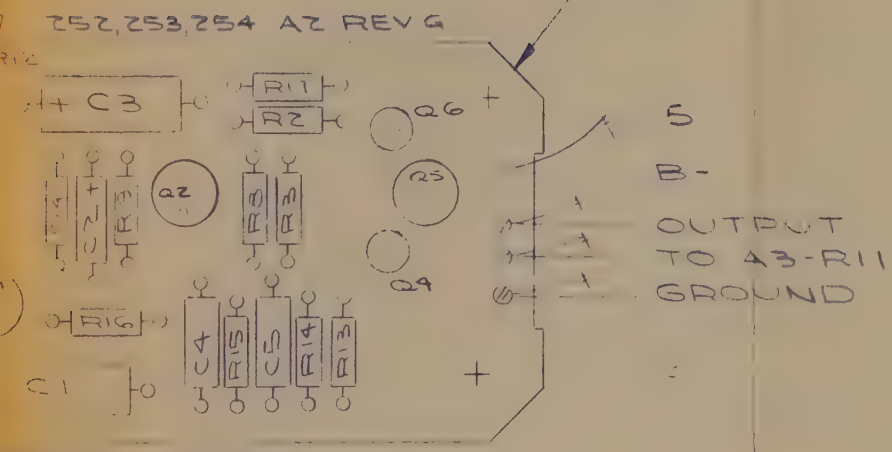
◉ RECEPT
⊘ PIGTAIL
† PIN (C

DRILL TABLE, PT 2

LTR	DESCRIPTION	QTY	PAD DIA
A	.025 (#75)	4	.090
B	.096 (#41)	1	.188
C	.023 (#75)	25	.060
D	.067 (#51)	4	.125
E	.040 (#60)	3	.090
NONE	.032 (1/32)	34	.090

REVISIONS	B 20137		
		CONT. ON SH.	SH NO.
SYM.	DESCRIPTION	DATE	APPROVAL
C	REVISED & REDRAWN		
D	DELETED CR1	7/9/64	
E	ADDED P.C.Bd.		
F	PT2 - DELETED 'A' HOLES, 'D' PAD WAS .090	9/24/65	
G	RE-ROUTED TRANSISTOR LEADS, P2 J3 11-19-65	11/19/65	

(2) PRINTED WIRING BOARD



FRONT VIEW

GLASS EPOXY G-10, 1/16 THK
CTORS - ONE OZ. COPPER
.031 (NOM.), .025 (MIN.)
-DIP LACQUER
LEM DIAG SEE B20115

- CTC 3310-2-03, PT4
TERMINAL - CTC 1785-2, PT3
2971-2) & PIGTAIL, PT5

(1) ASSEMBLY

SEE SEPARATE PARTS LIST

ASSEMBLY

A2 CARD

MODELS 252, 253, 254

DRAWN BY J. Becker April 13, 1964

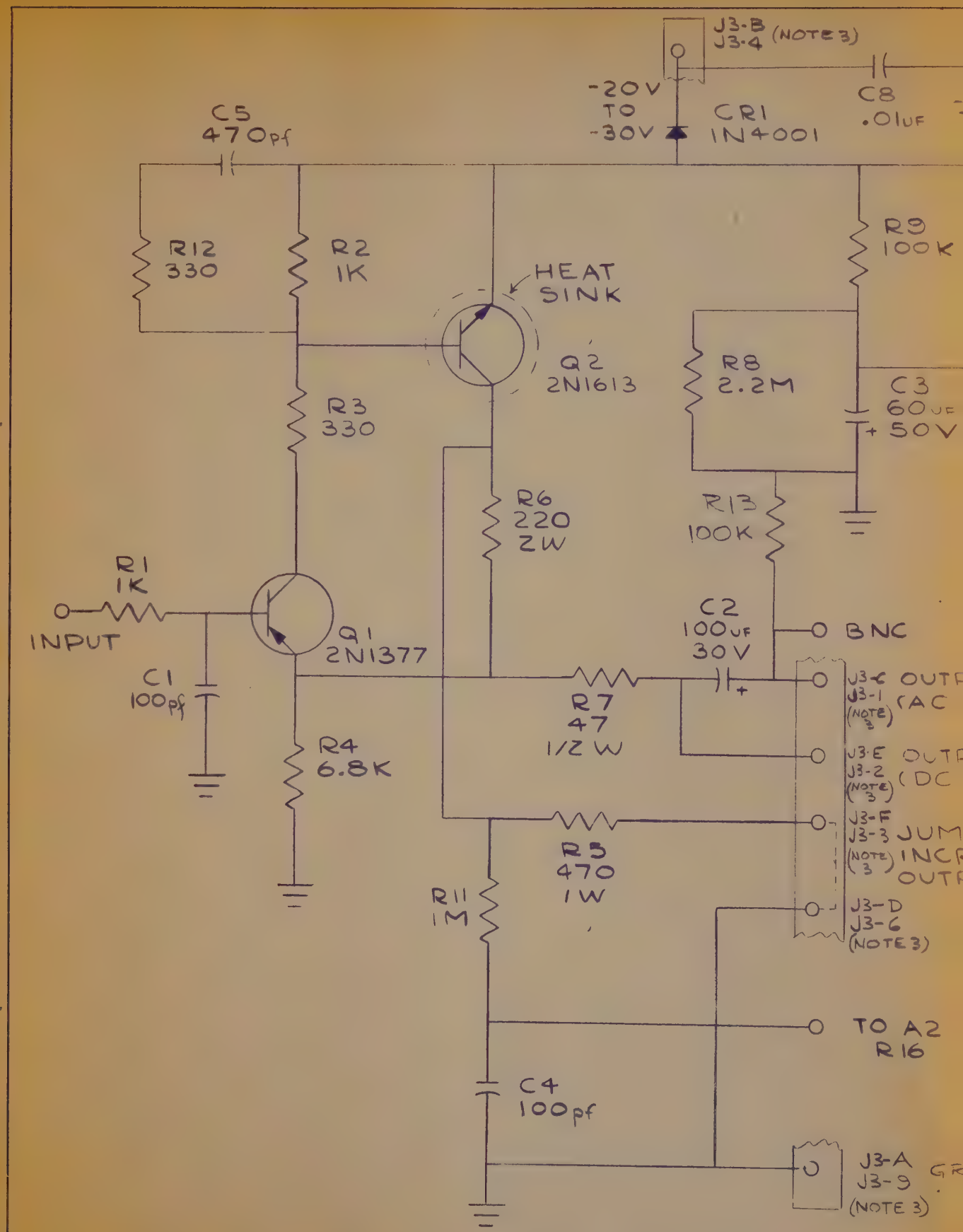
APPROVAL: DFTG. ENG.

ISSUE DATE

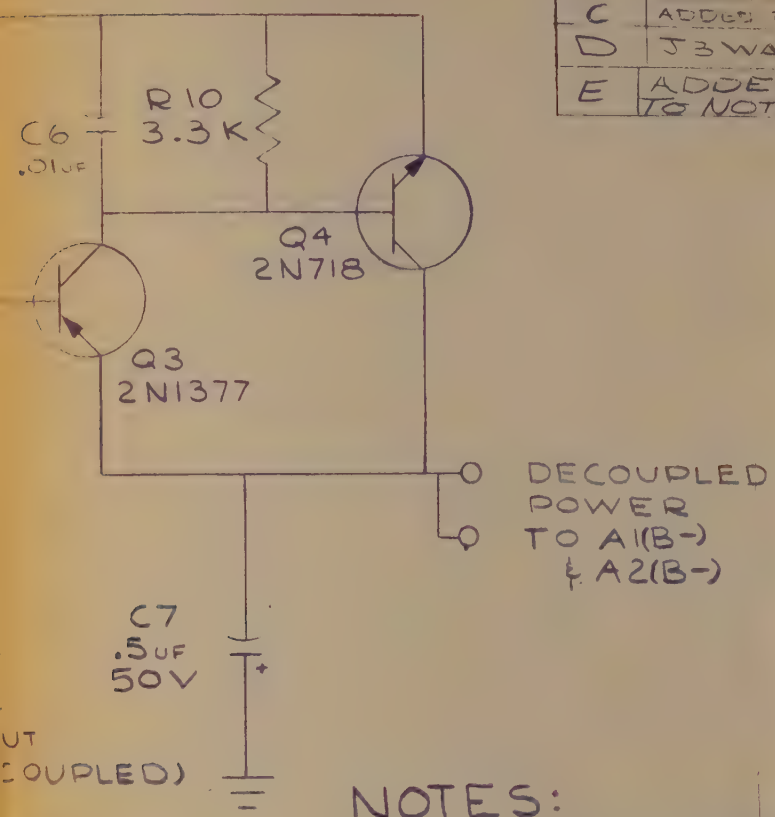
ITHACO, INC.
ITHACA, N.Y.

B 20137

CONT. ON SH. SH. NO.


J3-B
J3-4 (NOTE 3)
-20V
TO
-30V
CR1
1N4001
C8
.01UF
C5
470pf
R12
330
R2
1K
HEAT
SINK
Q2
2N1613
R9
100K
R8
2.2M
C3
60UF
+ 50V
R3
330
R6
220
2W
R13
100K
R1
1K
INPUT
Q1
2N1377
C2
100UF
30V
BNC
C1
100pf
R7
47
1/2 W
J3-C
J3-1
(NOTE 3)
OUTP
(AC
J3-E
J3-2
(NOTE 3)
OUTP
(DC
R4
6.8K
J3-F
J3-3
(NOTE 3)
JUM
INCR
OUTP
R5
470
1W
R11
1M
J3-D
J3-6
(NOTE 3)
TO A2
R16
C4
100pf
J3-A
J3-9
(NOTE 3)
GR

REVISIONS	B 20114		
	CONT. ON SH.		SH NO.
SYM.	DESCRIPTION	DATE	APPROVAL
A	ADDED R13 [illegible] 3-3-[illegible]	3/3/64	[illegible]
B	ADDED C8 [illegible]	[illegible]	[illegible]
C	ADDED PIN NO. & NOTE 3 [illegible]	[illegible]	
D	J3 WAS J1 9-20-65 [illegible]	9/20/65	[illegible]
E	ADDED 1/4W TO NOTE 1 [illegible] 1-26-65	10/[illegible]	[illegible]



UT
COUPLED)

UT
COUPLED)

PER FOR
EASED
UT CURRENT

OUND

NOTES:

1. UNLESS OTHERWISE NOTED, RES. VALUES IN OHMS, ± 5% TOL. 1/4W
2. LETTERS DENOTE CONNECTOR PIN DESIGNATIONS.
3. CONNECTOR PINS VARY DEPENDENT UPON CONNECTOR USED

RA

ELEM. DIAG.

A3 CARD

FMF 252-253-254-255

DRAWN BY J. B[illegible] February 26, 1964

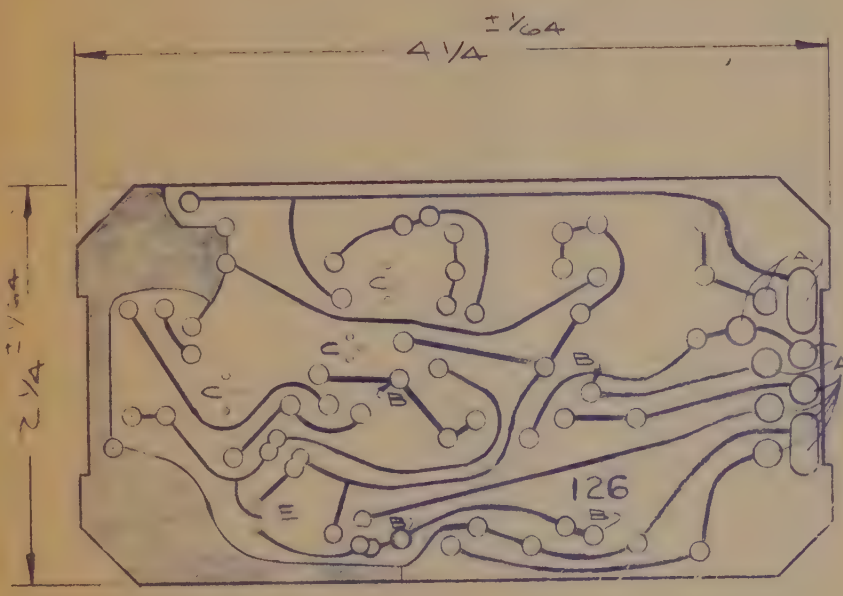
APPROVAL: DFTG. [illegible] ENG. [illegible]

ISSUE DATE February 27, 1964

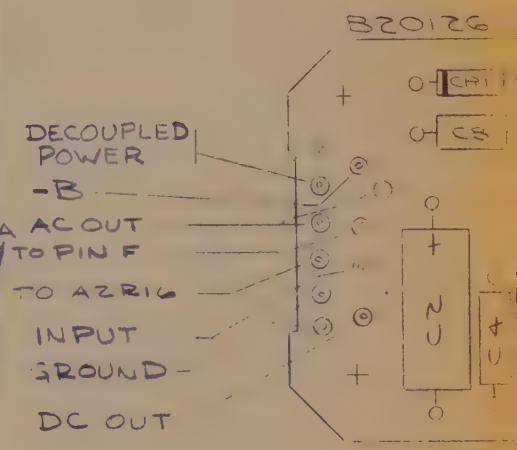
ITHACO, INC.
ITHACA, N.Y.

B 20114

CONT. ON SH. SH. NO.



3-



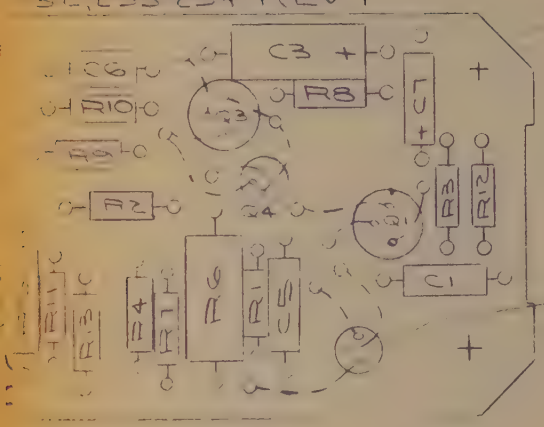
FF

MATL - GL
CONDUCT
WATER-D

DRILL TABLE FOR PT 2

LTR	DESCRIPTION	QTY	PAD DIA
A	.096 (#41)	11	.188
B	.067 (#51)	4	.125
C	.040 (#60)	9	NONE
D			
E	.025 (#72)	3	.060
NONE	.040 (#60)	49	.090

REVISIONS	B 20126		
	CONT. ON SH.		SH NO.
SYM.	DESCRIPTION	DATE	APPROVAL
D	REVISED & REDRAWN [illegible] 6-13-64	6/17/64	[illegible]
E	ADDED PRINTED CIRCUIT AND DRILL TABLE JB. 1-5-65		
F	DELETED 'D' HOLES 'E' HOLES WERE .250 DIA, QTY 1. 'B' PADS WERE .090	9/22/65	[illegible]



(2) PRINTED WIRING BOARD

Q2 - IN HEATSINK (THERMALLOY #1101-A)
4

ONT VIEW

ASS EPOXY G-10, 1/16 THK
ORS - ONE OUNCE COPPER
.031 (NOM), .020 (MIN.)
P LACQUER

(1) ASSEMBLY
FOR ELEM DIAG
SEE B20114
+ PIN & PIGTAIL

SEE SEPARATE PARTS LIST

ASSEMBLY

A3 CARD

MODEL 252, 253, 254

DRAWN BY J B [illegible] 1964

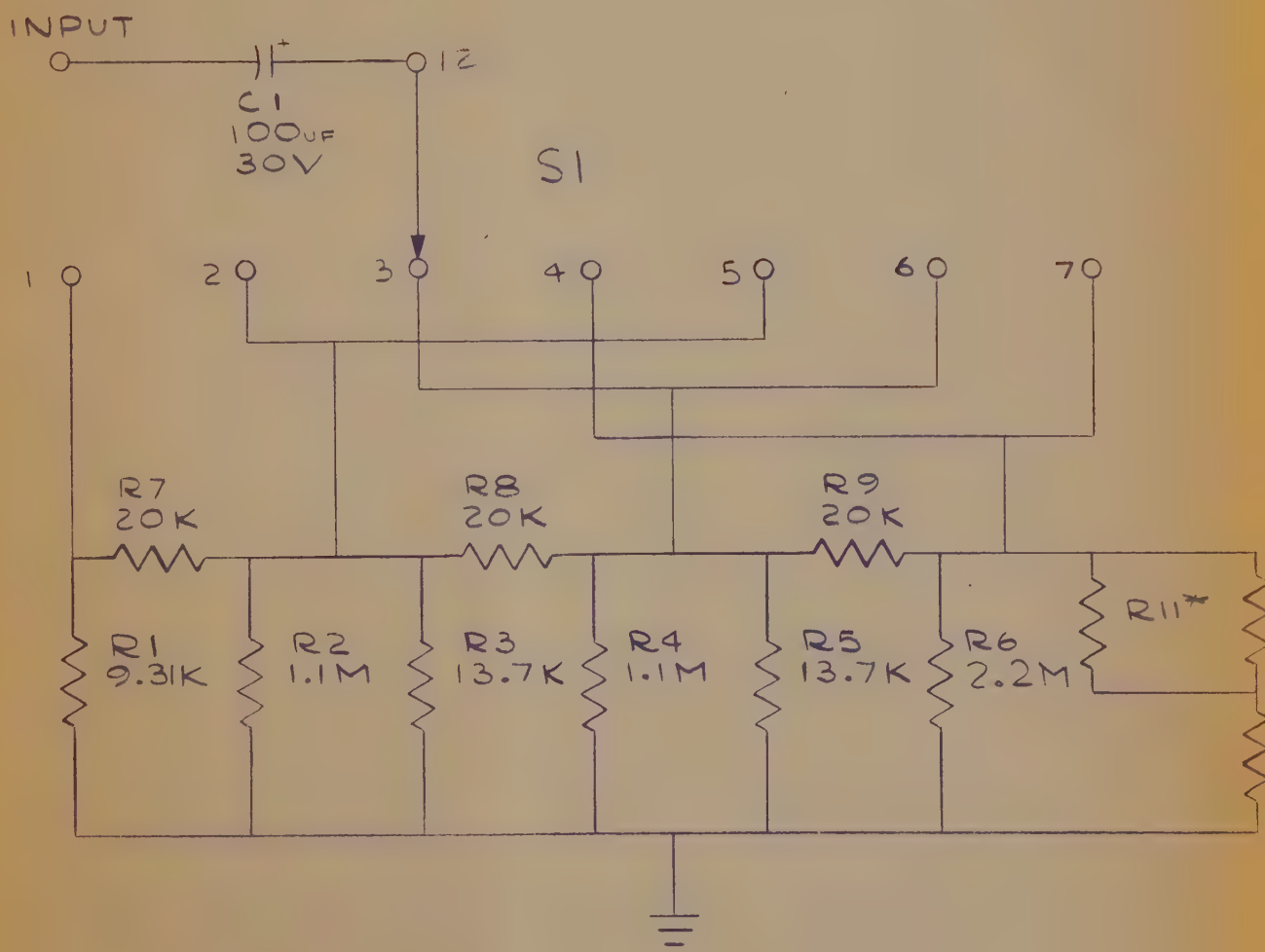
APPROVAL: DFTG. [illegible] ENG. [illegible]

RE ISSUE DATE June 17, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20126

CONT. ON SH. SH. NO.


INPUT
+
12
C1
100UF
30V
S1
1
2
3
4
5
6
7
R7
20K
R8
20K
R9
20K
R1
9.31K
R2
1.1M
R3
13.7K
R4
1.1M
R5
13.7K
R6
2.2M
R11*

REVISIONS			B 20121	
SYM.	DESCRIPTION	CONT ON SH	DATE	SH NO APPROVAL
A	ADDED C1	4-2-64 JB	[illegible]	[illegible]
B	NOTE 2 WAS RN60B	JB 11/3/69	[illegible]	
C	NOTE 2 WAS RC20	[illegible]	[illegible]	[illegible]

R12*

OUTPUT

R10
2.94K

NOTES:
1. RES. MARKED '*' ARE ITHACO PT. NO. A10034.
2. R2, R4 & R6 ARE RC07, 5%.
ALL OTHERS ARE ELECTRA, MF5C. ± 1%.

RG

ELEM. DIAG.

ATTENUATOR

FMF 5011-05 (25's [illegible])

DRAWN BY J Becker [illegible] 3-[illegible]-64

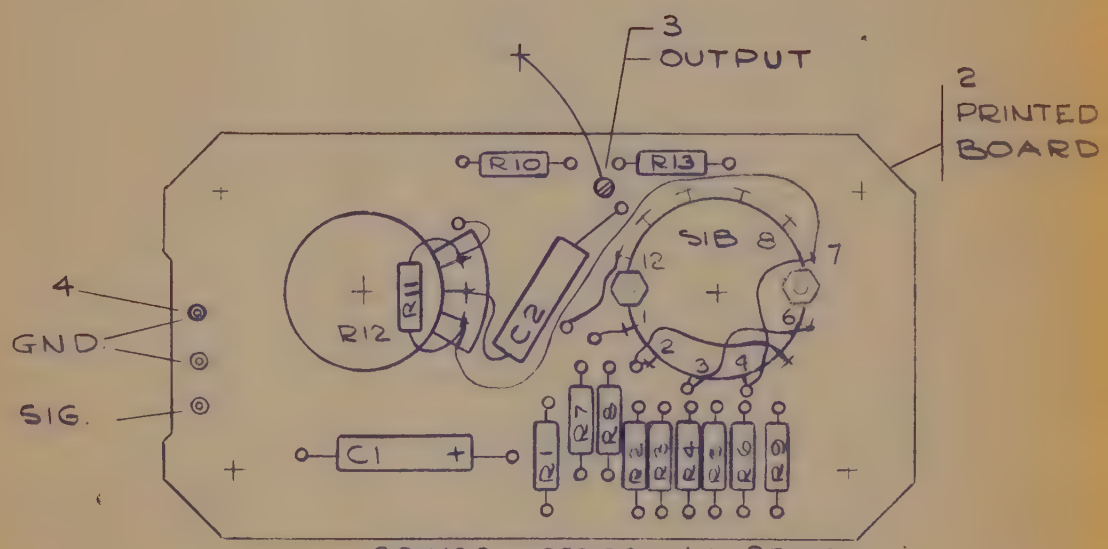
APPROVAL: DFTG. [illegible] ENG. [illegible]

ISSUE DATE April 16, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20121

CONT. ON SH. SH. NO.



B20139 253,254 A4 REV. B

FOR ELEM DIAG. SEE B20121
+ PIN & PIGTAIL

REVISIONS			B 20139
SYM.	DESCRIPTION	CONT. ON SH. DATE	SH. NO. APPROVAL
A	RELOCATED R1 THRU R10 ADDED R13 & C2 JB 9/22/69	9/22/69	
B	ADDED NOTE 1 JB 11/3/69		

WIRING
B20160

(1) ASSEMBLY

1. VALUE OF C2 & R22 DETERMINED BY FREQ. ROLL-OFF REQUIREMENTS. IF NOT REQUIRED, OMIT R22 & REPLACE C2 WITH JUMPER.

SEE SEPARATE PARTS LIST

EA
BG

ASSEMBLY

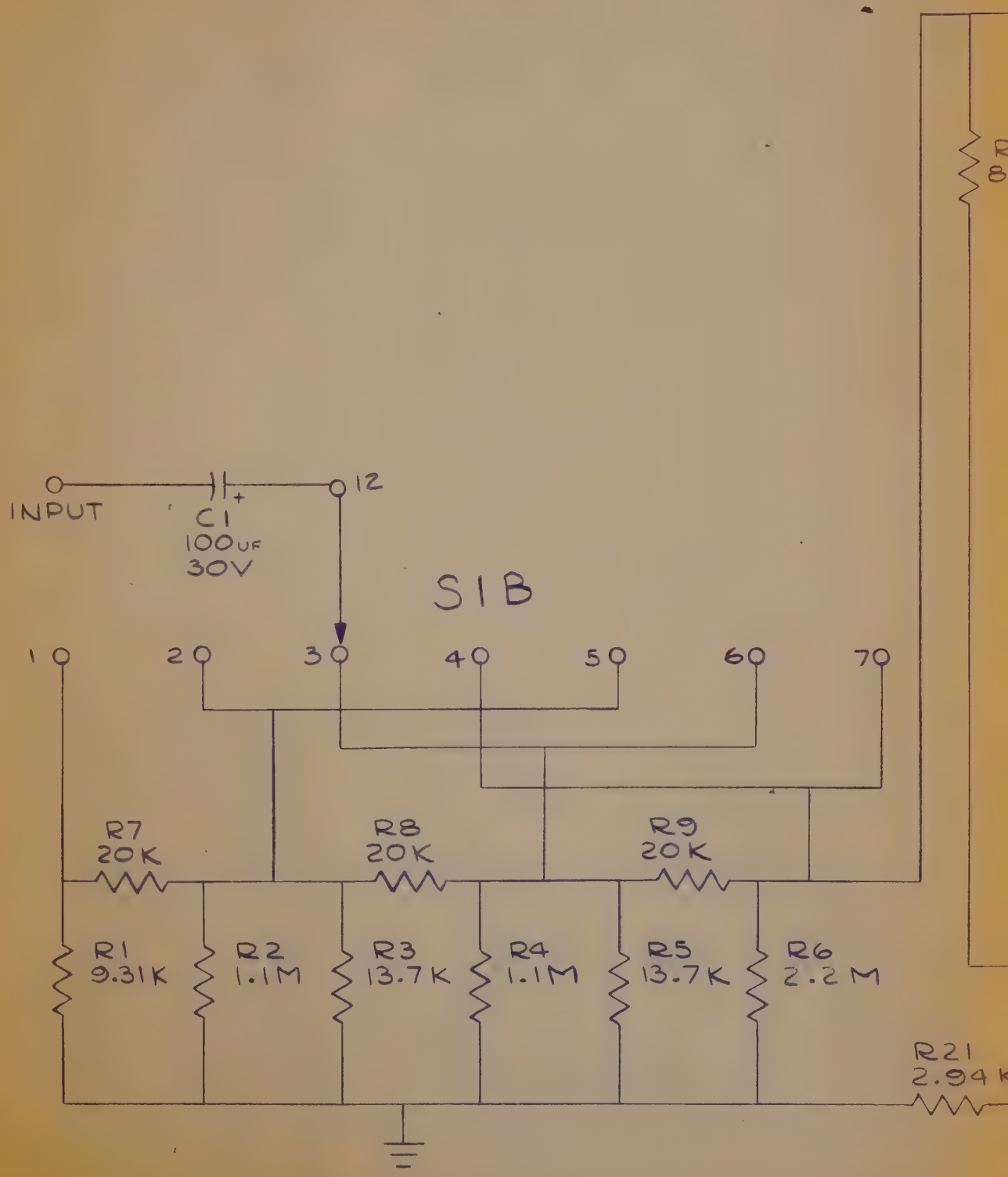
ATTENUATOR
A4
MODEL 254-253

DRAWN BY J Becker April 16, 1964
APPROVAL: DFTG. ENG
ISSUE DATE

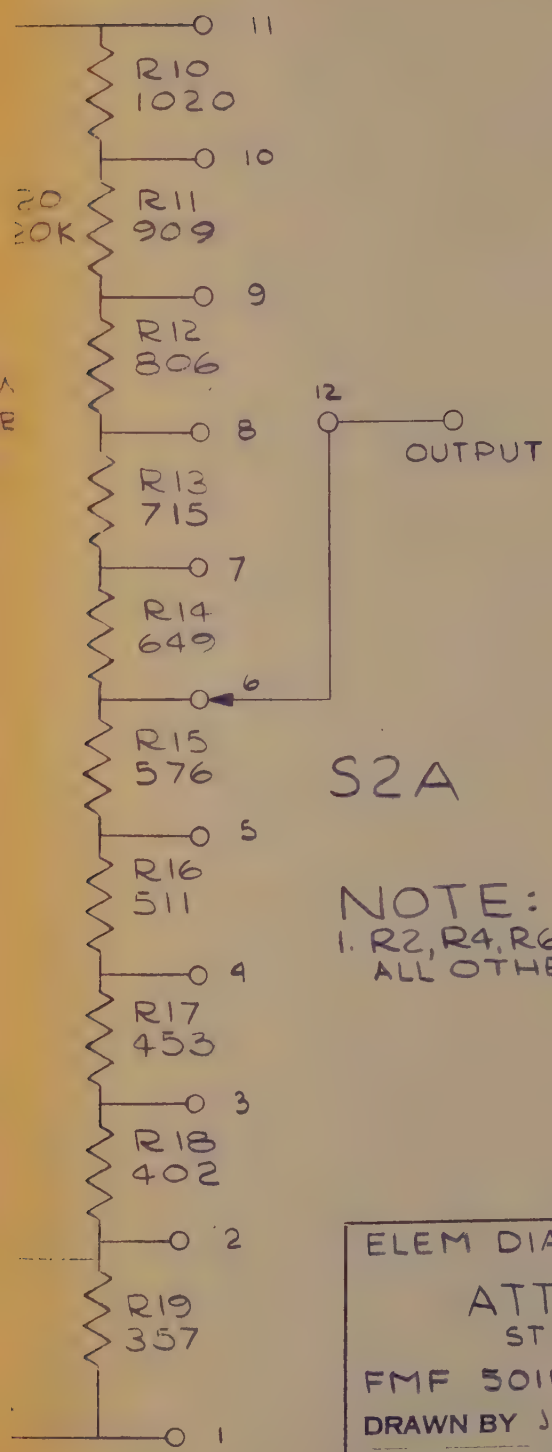
ITHACO, INC.
ITHACA, N.Y.

B 20139

CONT. ON SH. SH. NO.


INPUT
C1
100UF
30V
12
S1B
1
2
3
4
5
6
7
R7
20K
R8
20K
R9
20K
R1
9.31K
R2
1.1M
R3
13.7K
R4
1.1M
R5
13.7K
R6
2.2M
R21
2.94K

REVISIONS		B 20118	
		CONT. ON SH	SH. NO
SYM.	DESCRIPTION	DATE	APPROVAL
A	ADDED C1 4-21-64 JB	4/21/64	
B	NOTE 1 WAS RN60B. 11/9/69 JB		
C	NOTE 1 WAS RC20 10-27-65	10/27/65	



S2A

NOTE:
1. R2, R4, R6 & R20 ARE RC07, 5%.
ALL OTHER RES. ARE ELECTRA, MF5C, ±1%.

RG

ELEM DIAG.

ATTENUATOR
STEP GAIN A4

FMF 5011-05 (253A-254A)

DRAWN BY J. Beckir March 3, 1969

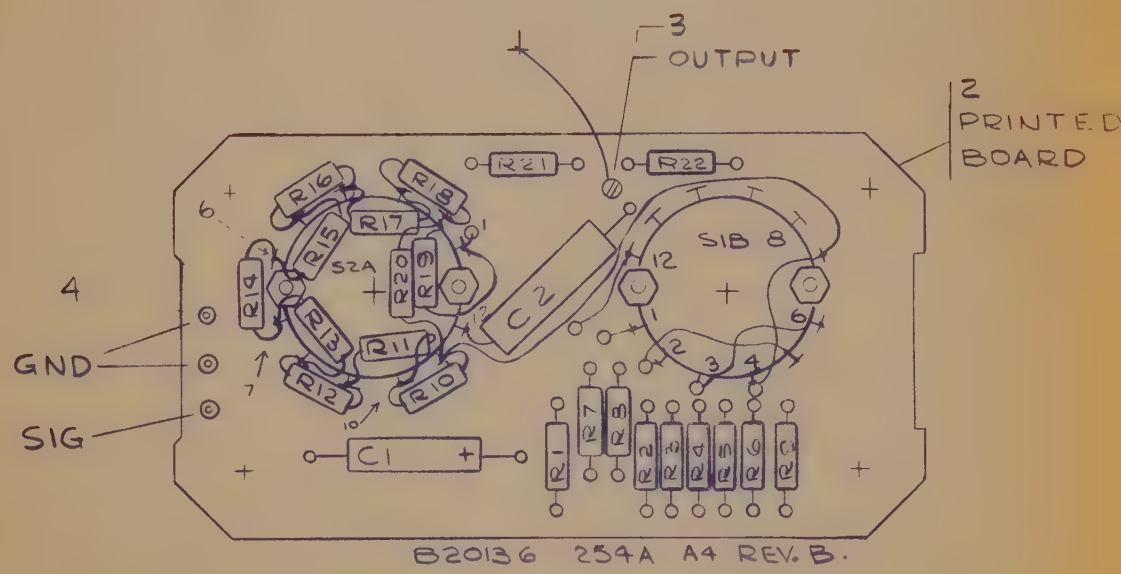
APPROVAL: DFTG. ENG. CS

ISSUE DATE April 16, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20118

CONT. ON SH. SH. NO.



B20136 254A A4 REV. B.

FOR ELEM. DIAG. SEE B20118

†PIN & PIGTAIL

REVISIONS		B 20136	
SYM.	DESCRIPTION (CONT. ON SH)	DATE	SH NO APPROVAL
A	RELOCATED R1 THRU R9 & R21 ADDED C2 & R22 JB. 9/21/69	9/ /69	
B	ADDED NOTE 1 11/3/69 JB		

WIRING
20160

(1) ASSEMBLY

1. VALUE OF C2 & R22 DETERMINED BY FREQ. ROLL-OFF REQUIREMENTS. IF NOT REQUIRED, OMIT R22 & REPLACE C2 WITH JUMPER.

SEE SEPARATE PARTS LIST

RA

ASSEMBLY

ATTENUATOR

A4

MODEL 254A – 253A

DRAWN BY J. Becker April 10, 1964

APPROVAL: DFTG. ENG.

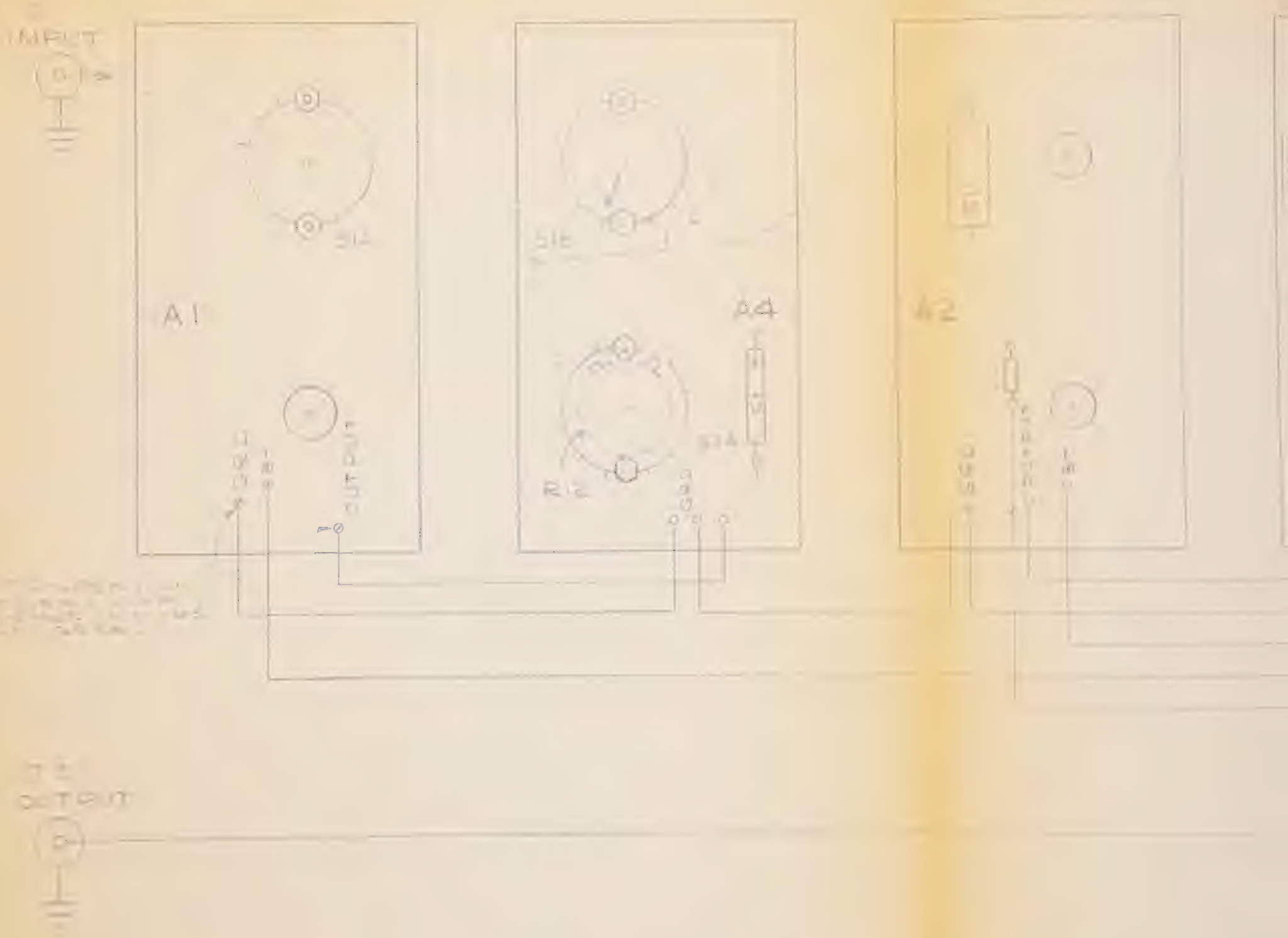
ISSUE DATE April 1, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20136

CONT. ON SH. SH. NO.

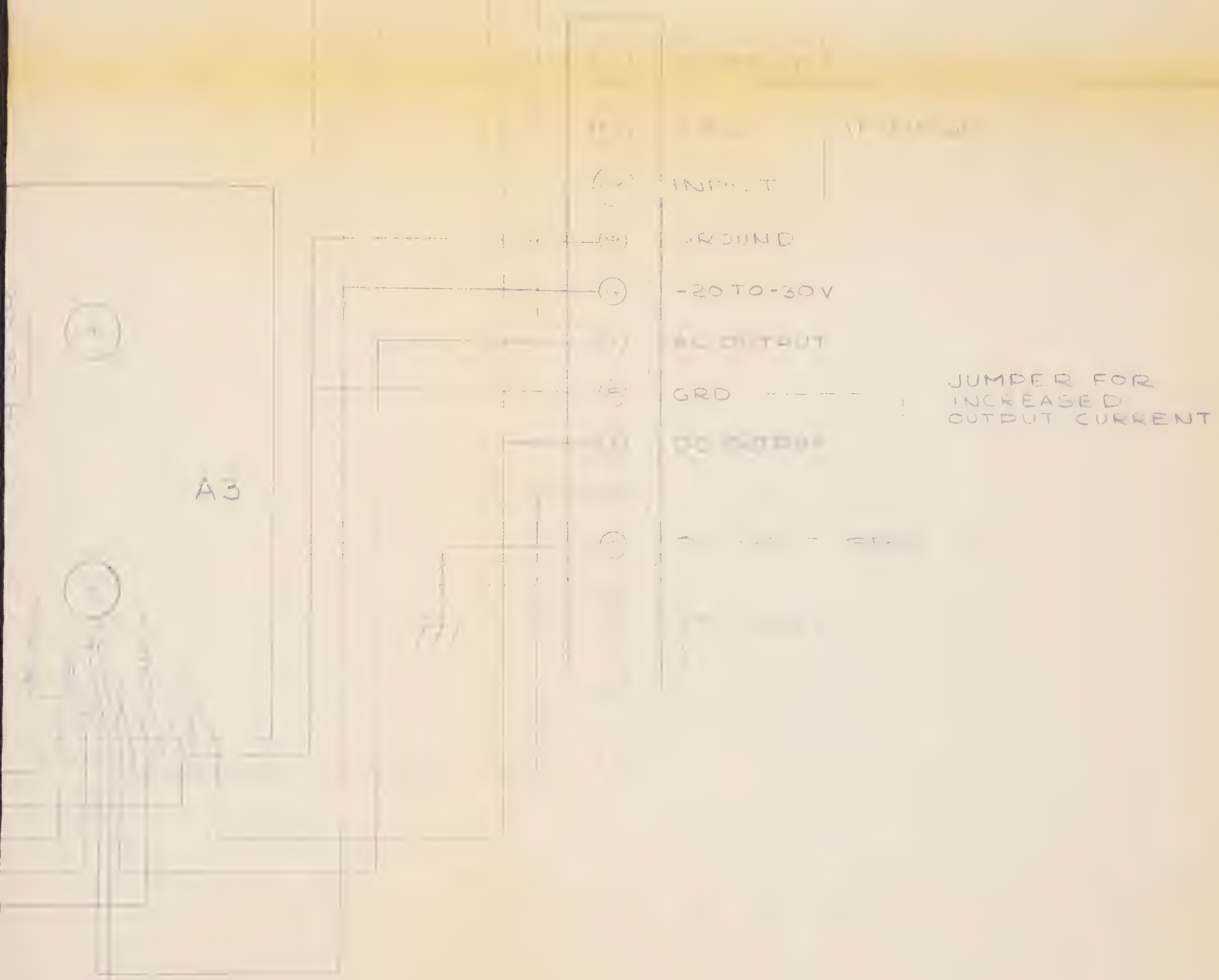
INPUT CONNECTIONS
MOD 255/255A-S14-C



REVISIONS C 30013

SYM.	DESCRIPTION	DATE	APPROVAL
A	REDREW AB.44 2/1/...	1/1/64	
B	[illegible] CONN		
C			

CONT ON SH SH NO

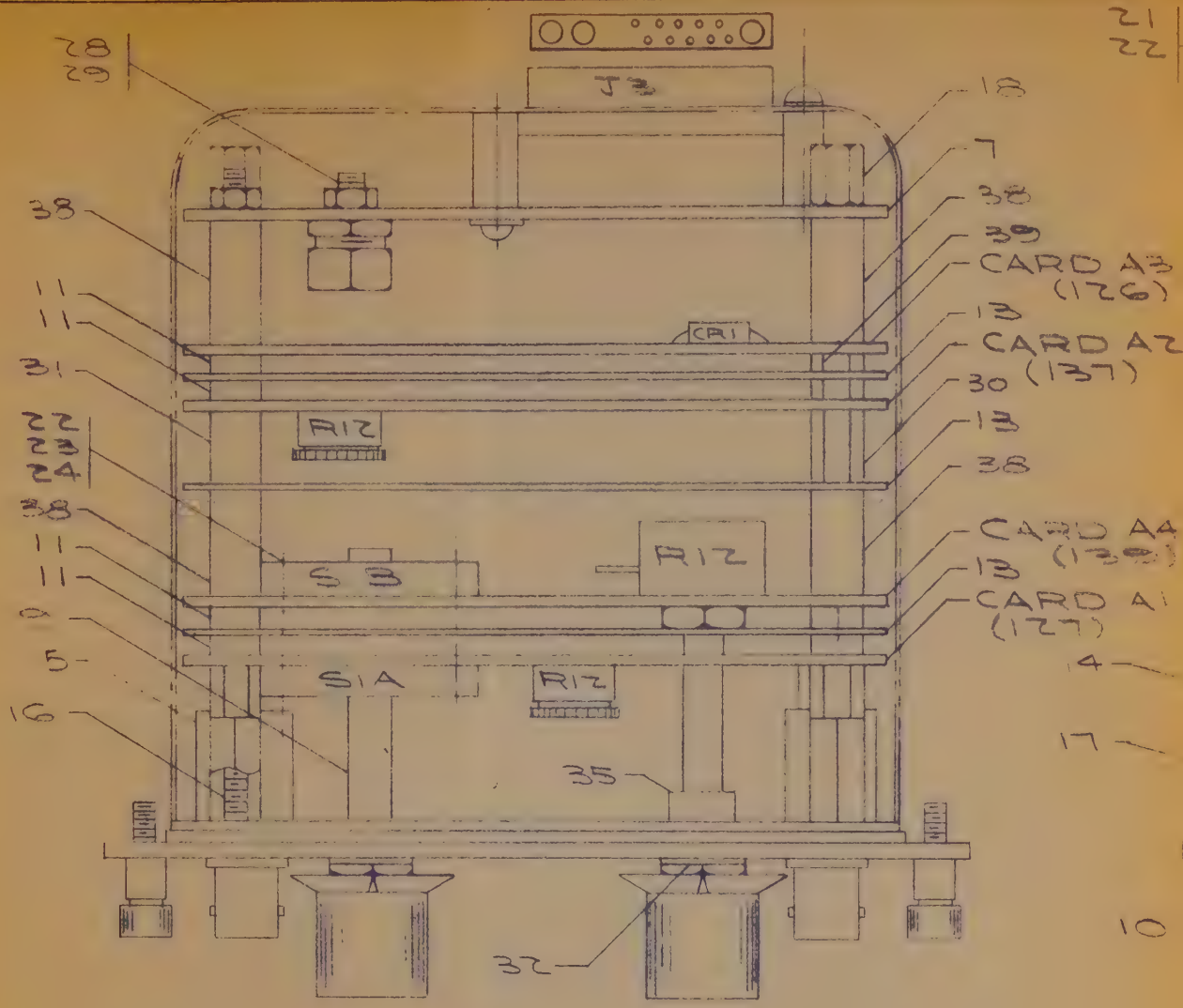


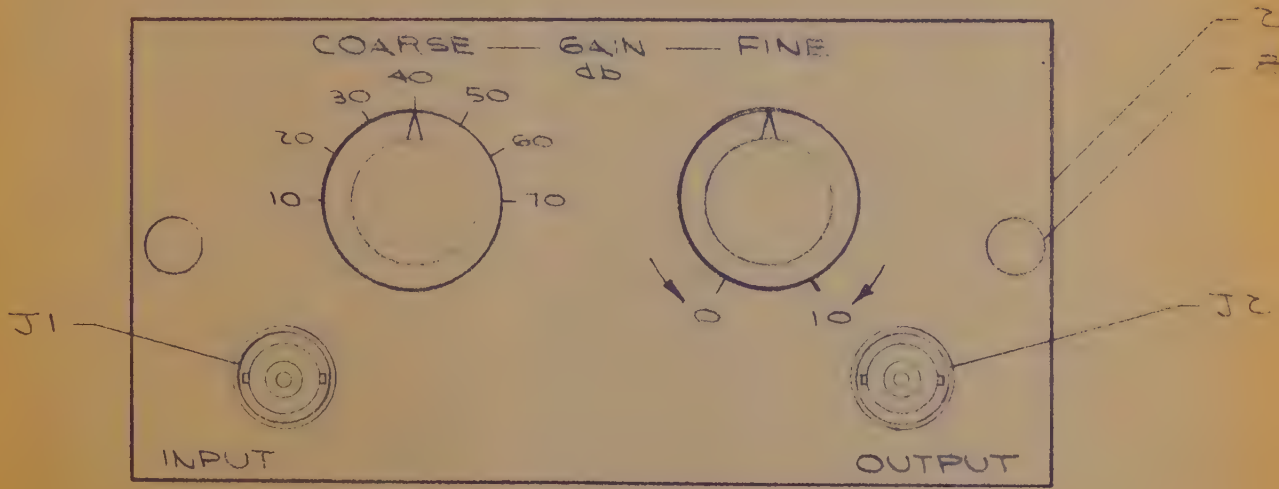
WIRING DIAG.
INSTRUMENTATION AMPLIFIER
FMF MODELS 252 253, 2542-[illegible]
DRAWN BY J. [illegible] May 2, 1964
APPROVAL: DFTG. ENG
ISSUE DATE

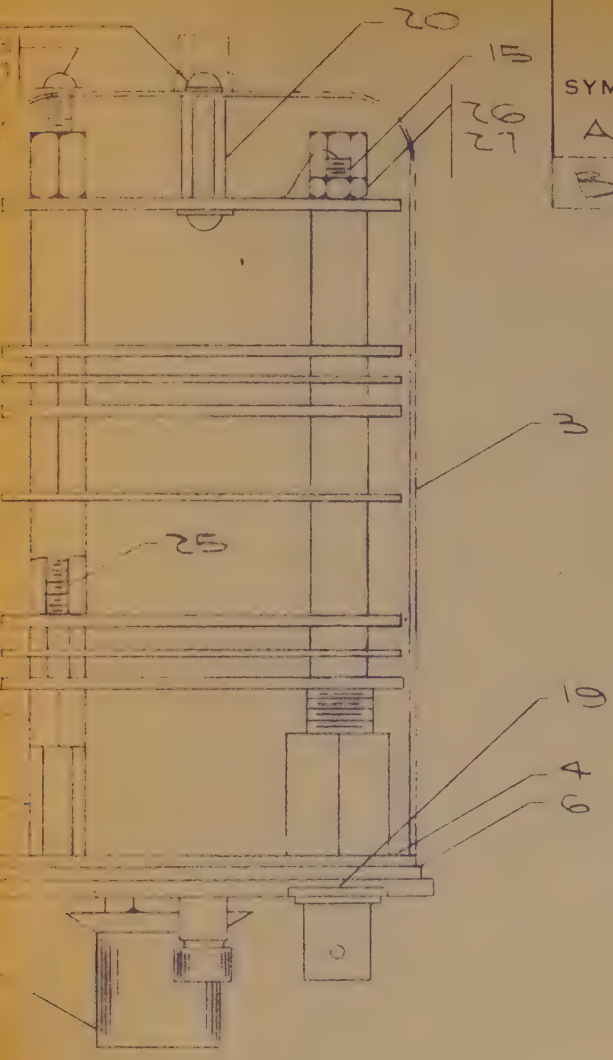
ITHACO, INC.
ITHACA, N.Y.

C 30013

CONT ON SH SH NO


J3
CR1
R12
S3
R12
S1A
R12
CARD A3 (126)
CARD A2 (137)
CARD A4 (139)
CARD A1 (127)
28
29
21
22
18
7
38
39
13
30
13
38
38
11
11
31
22
23
24
38
11
11
0
5
16
35
32
14
17
10


COARSE — GAIN — FINE
db
40
30
50
20
60
10
70
0
10
J1
J2
INPUT
OUTPUT



REVISIONS		B 20158	
		CONT. ON SH.	SH. NO.
SYM.	DESCRIPTION	DATE	APPROVAL
A	REVISED & REDRAWN [illegible], Oct. 26, 1964	[illegible]	[illegible]
B	GEN'L REVISIONS [illegible] Nov. 16, 1964	[illegible]	[illegible]

(1) ASSEMBLY
FOR WIRING DIAGRAM
SEE C30013

RA
RG

SEE SEPARATE PARTS LIST

ASSEMBLY
LAB AMPLIFIER

MODEL 254

DRAWN BY J.A. DYER, MAY 5, 1964

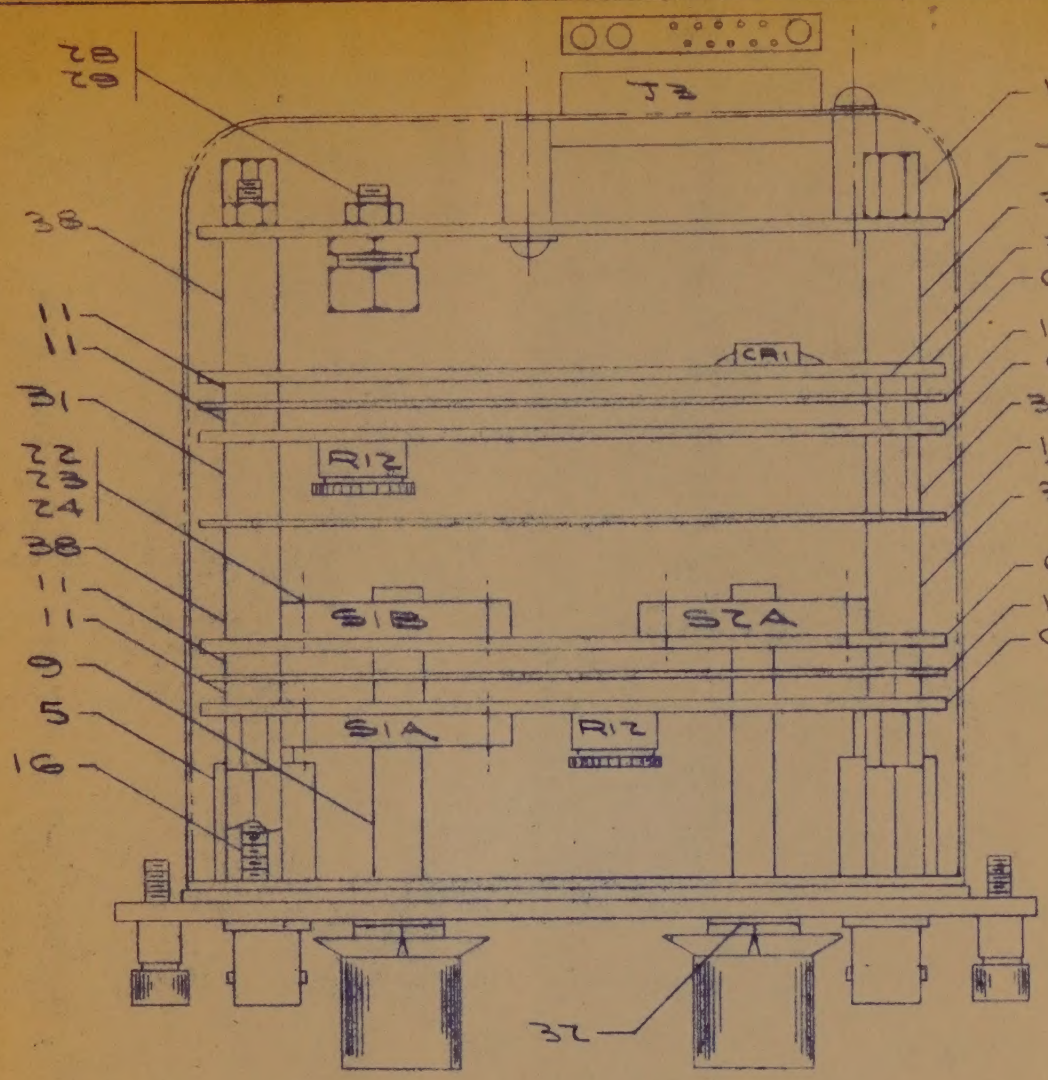
APPROVAL: DFTG. [illegible] ENG. [illegible]

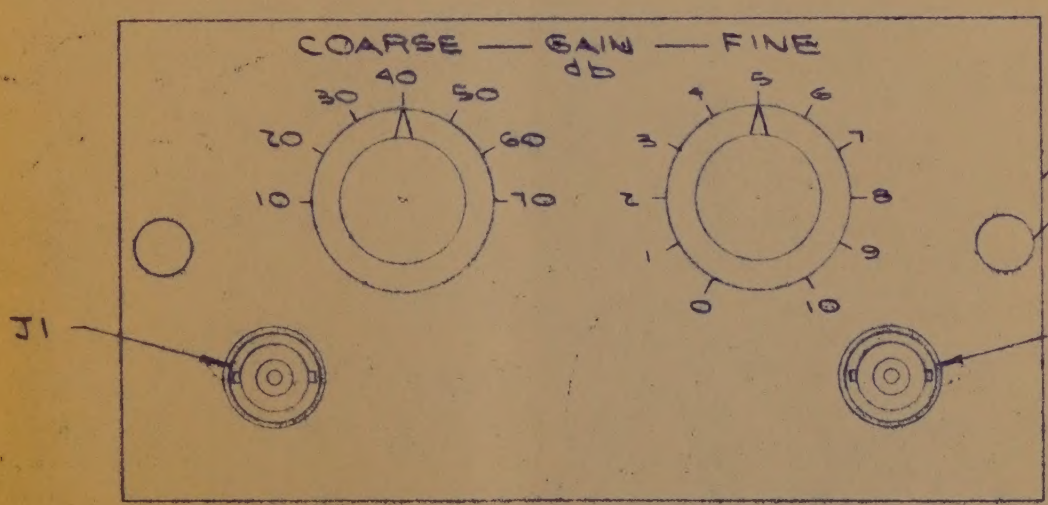
ISSUE DATE [illegible] 2[illegible], 1964

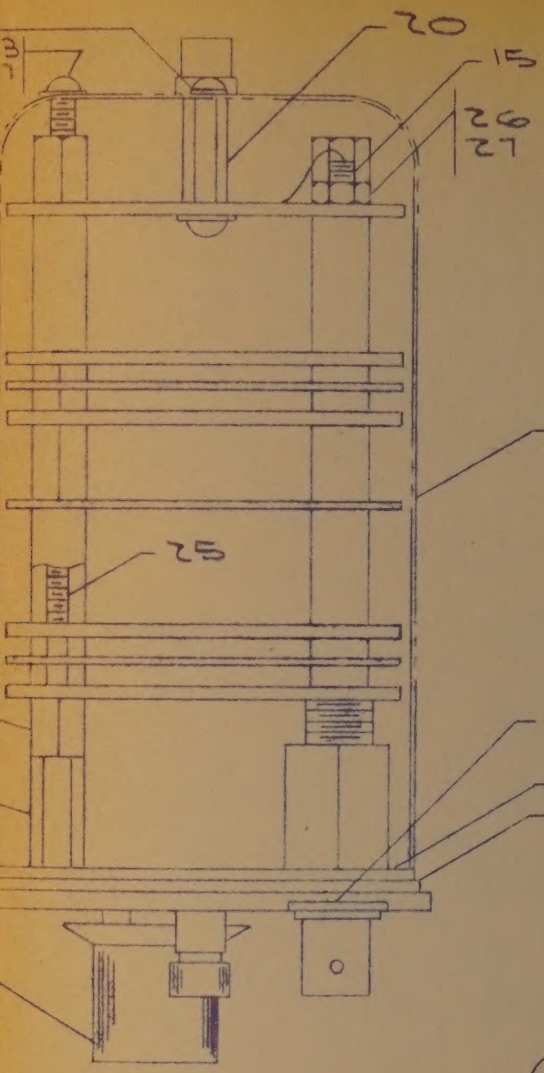
ITHACO, INC.
ITHACA, N.Y.

B 20158

CONT. ON SH. SH. NO.


28
29
J2
18
7
38
39
CARD A3
(126)
13
CARD A2
(137)
30
13
38
CARD A4
(136)
13
CARD A1
(127)
14
17
10
38
11
11
31
22
23
24
38
11
11
9
5
16
CR1
R12
S1B
S2A
S1A
R12
32


COARSE — GAIN — FINE
db
40
30
50
20
60
10
70
5
4
6
3
7
2
8
1
9
0
10
J1
J2
2
8



REVISIONS		B 20138 CONT. ON SH. SH. NO.	
SYM.	DESCRIPTION	DATE	APPROVAL
A	REDRAWN + REVISED J. Fallon, Oct. 30, 1964	10/30/64	
B	GEN'L REVISIONS J. BECKER NOV. 17, 1969	11/17/64	

(1) ASSEMBLY
FOR ELEM DIAG SEE
C30013

RA
RG

SEE SEPARATE PARTS LIST

ASM

LAB AMPLIFIER

FMF 254A

DRAWN BY J. BECKER 5-7-64

APPROVAL: DFTG. ENG.

RE ISSUE DATE October 30, 1964

ITHACO, INC.
ITHACA, N.Y.

B 20138
CONT. ON SH. SH. NO.

www.manualsplus.com
1034330